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Improved Water Wheel.

This invention is an improvement on the wheel known as "Tyler's Wheel," originally patented in 1855 and 1858, and recently in 1864. Very many of these wheels—1500 the inventor assures us—are now running in various parts of the world. This is the best endorsement the wheel could have, and we could say nothing more favorable to it. The feature recently introduced is an improved form of bucket, whereby the wheel runs with much less friction and obtains a greater per centage of the water power.

Fig. 1 represents the wheel and case in perspective, with a portion of the latter broken out to show the buckets of the former. Fig. 2 represents the wheel and case from the bottom side; also the step, and machinery for operating the same, so as to raise the wheel as it wears.

Fig. 1

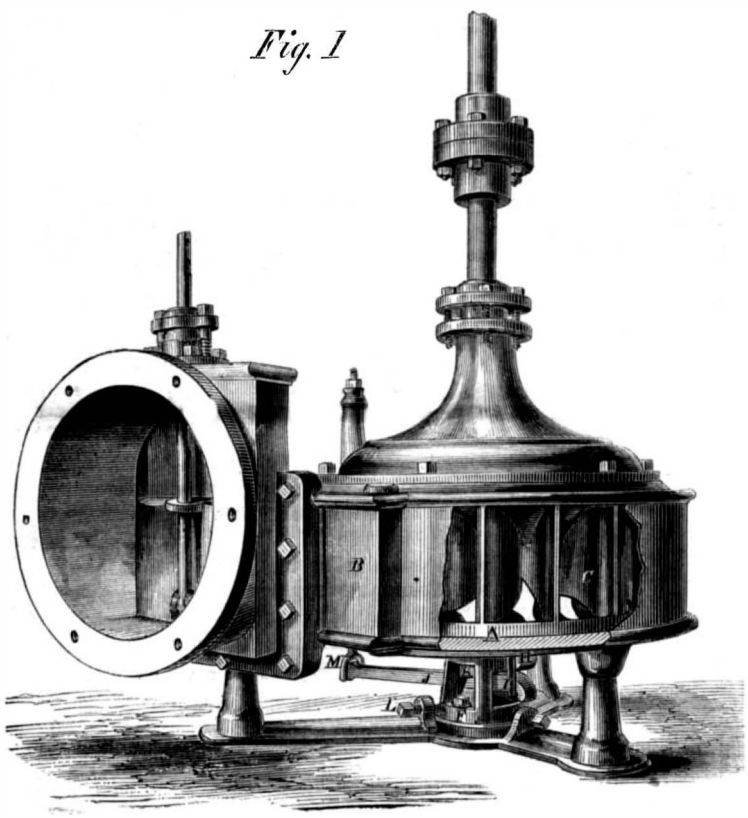

Fig. 2

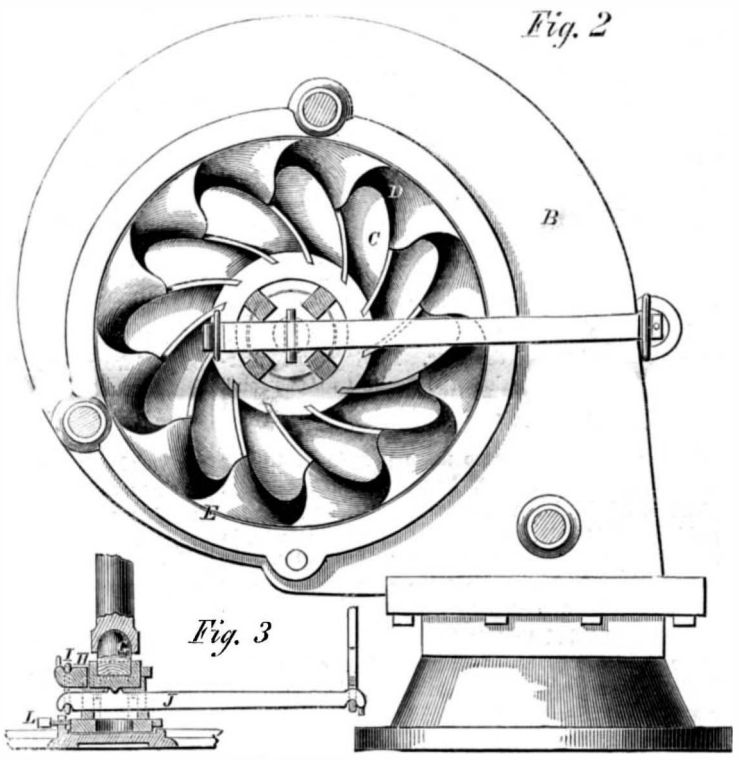

Fig. 3

TYLER'S IMPROVED WATER WHEEL.

The wheel, A, sets in the scroll, B, and has curved buckets, C, running from the hub, as usual. These buckets have a central discharge; that is to say, the water enters at the widest part, on the periphery, and escapes at the narrowest, or near the center. At this point the wheel is all cut away inside, so as to afford the least possible resistance to the exit of the water; just as a propeller wheel is smallest at the hub, so as to clear or leave the current as undisturbed as possible. As it is obvious that no force is exerted by the water on this water wheel at this point, it is plain that this feature must be a valuable one. In addition, the wheel has depressions, D, in the rim, which are difficult to show in a drawing. By means of these depressions, and the arrangement of bucket mentioned, the water escapes in a tangential direction, without extending the lower parts of the front portions of the buckets below the rim, E, or the main part of the wheel. Buckets so extended would be a great drawback when the wheel was working submerged; in fact, it would nullify all the good effect gained by the tangential discharge. The rim of the wheel offers but little resistance to tail water, merely that due to surface friction, while the tangential discharge adds greatly to the power, for the water naturally takes that direction.

The step (Figs. 1 and 3) of this wheel is peculiar and well arranged. It consists in furnishing the casting, F, in which the bearing block, G, sets, with a horn, H. A stirrup iron, I, connects the lever, J, to this horn, so that it has free motion. In the center of the lever the cylinder, K, sets. It carries the bearing block, and slides loosely in the casting, F. It also sets on the lever, J, so that when the lever is moved the cylinder works easily and accurately upward in the casting. For convenience the lever is acted on by a rod, M, on one side of the case, so that it is always easy of access. In this way the wear of the bearings may be compensated for, and the same may also be kept in line horizontally, or true in the scroll, by the use of the set screws, L, at the bottom. The claim on this wheel is for the depressions, D, on the discharge or inner side of the rim, at the bottom, to permit the tangential discharge of the water, so arranged that no part of the buckets extends below the rim.

These improvements were patented through the Scientific American Patent Agency, Oct. 13, 1864, by John Tyler, of West Lebanon, N. H. For further information address him at that place.

A saw-filer in New Bedford, whose practice is quite extensive in doctoring dull saws, puts out a sign in the form of a handsaw with the words "saw dentist" painted on it.

Some Effects of the Erith Explosion.

The most remarkable effect of the explosion was upon animals in the large region around. The mortality among canary birds for miles around was very great; they dropped from their perches and died of fright, or of the concussion. Parrots were badly frightened, and dropped from their perches to the bottoms of their cages, refusing to speak for some hours. Dogs, cats and other animals manifested symptoms of the greatest alarm. For many miles from Erith the cattle in the fields, at first struck dumb and motionless at the stunning report, presently set off in the wildest excitement, racing around the enclosures, and could not be quieted for some hours. Two women's dresses were seen to fall at Woolwich, four miles off, and a human finger fell at Deptford, about as far away. On an estate in Belvidere, two or three miles from the magazine, a tun of glass is reported insufficient to replace that broken. All the churches for fifteen miles around, and most of them for twenty miles, have suffered by broken windows and cracked walls.

DON'T EAT RABBITS.—The Germans, like other nations, have their own peculiarities in the choice and treatment of domestic animals, whether of the useful or ornamental class. Rabbits are never eaten by them. A German has as great horror of rabbit pie as an Englishman would of a steak of horse flesh, which Germans, like Belgians, never feel afraid of, but regard rather in the light of a delicacy. The rabbit, like the guinea pig, is in Germany nothing but a child's plaything.—*Phila. Ledger.*

[This is an absurd statement. Rabbits are eaten as much in Germany as anywhere, and are well cooked there, moreover.—EDS.

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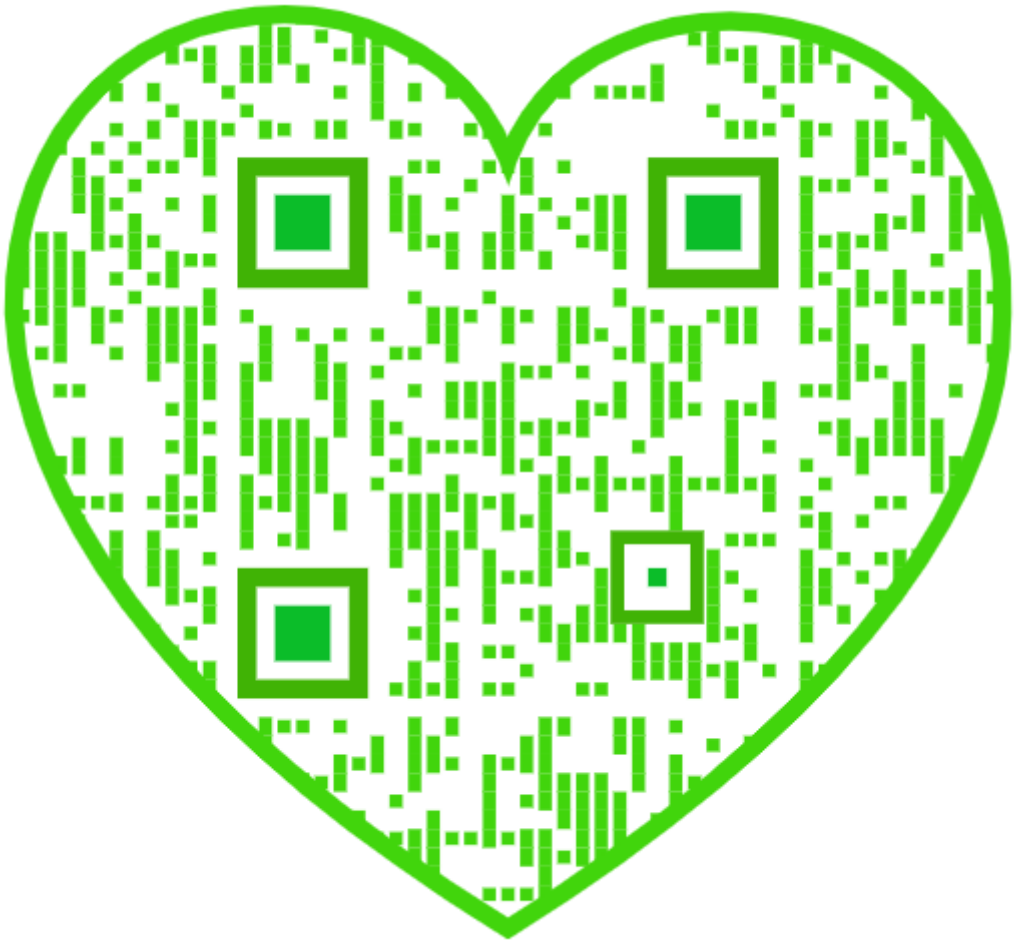

AN ENGLISH LARD FACTORY.

We will take our readers on a tour through the extensive manufactory belonging to Messrs. Shaw, Phillips & Billings, situate on the banks of the Avon, about two miles from Bristol, England—the metropolis of the west. Messrs. Shaw, Phillips & Billings, own one of the oldest and most extensive soap manufactories in the kingdom, and although it is but eighteen months or so since they added to this the business of lard refining, they have, during that short period, imported the raw material from America at the rate of 1,000 tuns per annum, in addition to the supplies received from some of the home markets. Taking this 1,000 tuns as a basis for calculation, it would produce, say, about 700 tuns of the finest refined lard, in addition to about 250 of the lard oil, and certain refuse substances, which are turned to profitable account in the soap manufactory. Through the yard to the refinery we are accompanied by Mr. Phillips, one of the partners. The head is first knocked out of a tierce of the crude material, the produce of Indiana and neighboring States, where the renowned hog-slaughtering cities of Chicago and Cincinnati collect and distribute to all quarters of the globe pigs, pork, lark, and bladders. The lard used by Messrs. Shaw, Phillips & Billings is imported n tierces and barrels from New York, the supply to that market from the pork-packing neighborhoods having been very plentiful of late, on account of the great increase in the crops of Indian corn, upon which the pigs are mostly fed.

HOW LARD OIL IS MADE.

But let us commence operations. Woolen bags, close grained and manufactured for the purpose, are filled with the crude lard, taken from the tierce which has been opened for our inspection. A series of these bags are placed between the plates of immense hydraulic presses, where they remain about eighteen hours, under a pressure of from 100 to 150 tuns. By this means the lard oil is expressed in so pure a state that if a drop be taken on the tip of the finger, and held up to the light, it glistens like a diamond. The oil as it is pressed out is caught in a reservoir below, and from this it drains through a pipe into an immense cistern beneath the floor. Having once ascertained this interesting fact, the desire to "pass on" became stronger and stronger as the thoughts of the possibility of dropping through the ricketty boards into the oily lake became more prominent to our mental vision. We wait, however, while a small phial is filled with a sample of the oil, which our guide considers it incumbent upon us to taste, in order to realize fully its good qualities as a lubricating agent. We next inspect the contents of one of the bags which has already undergone the necessary pressure, aud find that it has not only assumed a more solid form, but has improved in color. Mr. Phillips having cut from the cake of compressed lard a square piece to carry with him for the purpose of comparison, we again join him in the enjoyment (?) of another little relish, and proceed on our way, marshalled by our guide, who carries like a trophy on the point of a stout jack-knife the snowy specimen.

Before finally quitting this department we are desirous of ascertaining what becomes of the oil which we have already seen dripping into the underground reservoir. A force pump raises it into pipes, through which it is conducted into a refining tank, and thence into a series of immense iron cisterns enclosed in a dark cavern-like chamber, heated with steam flues, and kept winter and summer, day and night, at an even temperature. One of these tanks holds twelve tuns of oil, and the others about five tuns each. The contents after remaining uuder the influence of the regulated temperature, without being disturbed, for a certain time, are freed from any impurities that may remain before being sent on to the market.

HOW THE CAKES ARE REDUCED TO LARD.

When all the oil that it is possible to extract from the lard has been expressed, the remaining cakes are taken from the woolen cloths and thrown into a cistern, where they are liquified at a temperature of 150°, and transferred from this by means of pipes to the room which we shall now describe. In the center is a range of immense pans, each heated by a steam chamber, reaching about half way up the outside. Over each pan is a tap, from which supplies of the liquid lard are drawn. The pans thus filled, and the necessary clarifying agents added, all is simmered together for six hours, at a heat of 210°. The impurities, with the clarifying agents, come to the surface in the form of a rough brown mass; and if, good reader, you were to mount the brick wall and look into one of the coppers under the idea that you might see lard, you would be disappointed, unless, as in the case with us, some kind friend with a long stick were to probe the mass and extract a specimen from beneath. This, however, is not the usual means taken to release the pure material from the dross; it is drawn off in large tin vessels by means of taps placed near the bottom of each boiler.

HOW THE LARD IS SOLIDIFIED.

Two large coppers, built on the floor at either end of the room, are filled with the liquid as we have just seen it. An air-pipe, two inches in diameter, enters the mass right in the center, and keeps the lard in a state of incessant agitation until it begins to congeal, the process generally occupying about two hours. The air, permeating through every particle of the mass, renders it impalpably smooth and increases its whiteness. While still in a semi-liquid state, the copper is surrounded by men and boys. One lad hands up the bladder ready for filling; the stem of a funnel is inserted in the neck of the same; and before you can say "presto," it assumes that rotundity and snowy baldness so familiar to us all. The bladder is tied while floating in a tub of lukewarm water, and then popped, with extraordinary agility, by another boy into a vessel containing cold water, where a short time suffices to harden it. All around this apartment are ranged wide shelves groaning under the weight of the plump, chaste, though irregular-shaped balls. An immense stack of neat little kegs of the usual size, filled and fastened down ready for transmission to our retail provision stores, occupy one side of the apartment, and beside them a range of tins all filled in the same manner, but uncovered. The kegs, we are informed, are made in Liverpool, a town long celebrated for its coopers. Though Bristol can boast of many such craftsmen, it seems that lard and other small kegs cannot be made there at prices that will compete with the Liverpool terms, although carriage has to be paid from the latter place.

CONCERNING THE BLADDER DEPARTMENT.

It is truly refreshing to leave behind us the warm oily atmosphere of the clarifying room for that or another large apartment, well ventilated with lattice work on each of its broad sides. Let the reader now imagine an enormous overgrown sideboard of the whitest deal, on the broad shelves of which are ranged, waiting for dispatch, more ready filled bladders. Looking up, we begin to think we have wandered into the abode of an itinerant vendor of children's farthing balloons, which are suspended in bundles, and sway to and fro in the breeze. We are informed, however, that these are the lard bladders undergoing the necessary preparation to render them fit for commercial purposes. The manager of this particular department now undertakes to put us through the mysteries of bladderology. A very communicative and obliging person is our new guide. He shows us countless barrels of bladders in pickle—grizzly uninteresting-looking things—as they come from the United States. Each barrel is marked with the number it contains, which is almost invariably either 2,000 or 2,300. The head of an empty barrel placed under what we would at first glance judge to be a wine merchant's bottling tap, serves as a worktable for the operator. The bladders, softened to the proper consistency, are distended by a supply of air from this tap, which has proved a wonderful saving to the lungs of the manager and his subordinates. It appears that in all establishments of this kind the bladders, in order to be trimmed and bleached, are blown up by the workmen. The effect of the constant expulsion of wind on the operators is sometimes of a serious character, and workmen are frequently obliged to remain at home for a week or two to "gather wind." It occurred, however, to a member of this firm, that by means of a tap they could make use of the compressed air already forced by steam power into the pipes, for purposes which we described, to fill the bladders also. This simple idea has been adopted, and with such good effect that, while much time and intoxication are saved, the bladders are more perfectly blown, and are, in consequence, easier to trim. Our instructor submits one or two sample bladders to the action of the air-tap, by which we are able to judge that calves' bladders, more than any others, are fond of assuming contorted forms when filled. Pigs' bladders are the largest produced, and run in more uniform sizes than others. We were shown some capable of containing 60 lbs. of lard. Bullocks' bladders are more shapely than any others, and on an average will contain 25 lbs.; but in all cases, the smaller the bladder the better for the preservation of the contents; hence small bladders, when filled, command a higher price in the market than large ones.

Imperial Tokay.

Tokay wine is much esteemed by wine drinkers, but as its high price excludes it from general use the following notice from the *Moniteur Vinicole* may not be uninteresting:—

"The village of Tokay which gives its name to the wine is situated in Hungary, on the top of a hill near the meeting of the Rodrog with the Theiss. The vineyards are to the west of Rodrog, and they occupy a space of ten square miles. The earth is of yellow chalk mixed with large pebbles. The wine is white, and the vintage is commenced as late in the year as possible, but generally at the end of October. There are four different kinds of Tokay. The first is made by placing the grapes when cleared of all rotten fruit in a wooden vat, with a double bottom, of which the one on which the grapes rest is pierced with small poles. The vat is filled with grapes and covered with boards. After a few hours the grapes become heated to 80° Fah., and fermentation sets in. The fermentation destroys the tartaric acid, and the weight of the grapes forces the juice through the holes in the bottom. The grapes are then trodden under foot, and the wine is poured into small casks, where it remains exposed to the air a month after having fermented for two days. This is the wine which is generally exported. When of a good quality it has a silvery, oily color, the taste sweet and mellow, with a peculiar earthy flavor, slightly astringent and aromatic, with good body. This wine may be preserved for an almost indefinite period, but is not drinkable until it is three years old. The ordinary price of Tokay wine of first quality purchased at the vineyard is from 5s. to 6s the bottle. The Emperor of Russia keeps a commission agent at Tokay who purchases 40 or 50 casks of the best wine every year. Some vine-growers in the Arriege cultivate vineyards on the tops of the highest mountains in calcareous earth covered with stones similar to those found in the vineyards near Tokay, but they have not as yet succeeded in producing anything as good as the Hungarian wine."

To Keep Tires on Wheels.

A practical man says on this subject:—"I ironed a wagon some years ago for my own use, and before putting on the tires I filled the fellies with linseed oil; and the tires have worn out and were never loose. I ironed a buggy for my own use seven years ago, and the tires are as tight now as when they were put on. My method of filling the fellies with oil is as follows: I use a long cast-iron oil heater, made for the purpose; the oil is brought to a boiling heat, the wheel is placed on a stick so as to hang in the oil each felly an hour for a common sized felly. The timber should be dry, as wet timber will not take oil. Care should be taken that the oil be not made hotter than boiling heat, in order that the timber be not burnt. Timber filled with oil is not susceptible to water, and the timber is much more durable. I was amused some years ago when I told a blacksmith how to keep tires tight on wheels, by telling me it was a profitable business to tighten tires, and the wagon-maker will say it is profitable to make and repair wheels—but what will the farmer, who supports the wheelwright and smith, say?"

CARE OF DAHLIA ROOTS.—The roots should be dug up as soon as the first hard frost has spoiled their foliage. Cut the stem about six inches above the tubers; then lay them up to dry. After they have become dry, pack them in the cellar, there to remain until they begin to grow in the spring; then plant them out in the borders, previously dividing the roots if an increase is required.

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THE EXPLOSION AT ERITH.

From the London *Mechanics' Magazine.*

The daily press has done its duty, and long since the people of Britain have been presented with full and possibly accurate details of perhaps the most fearful explosion which ever occurred within our shores. The *Mechanics' Magazine*, however, has a higher and infinitely more important duty to fulfil than the mere catering of news for the masses. Its pages will be read by future generations, and we therefore feel no hesitation in recording certain particulars of an event which has been the absorbing topic for days, and will bear an interest far into the future. It is to be regretted that the details of past explosions, and these have not been few, have not been more carefully treasured up in a readily accessible form than they have been. Particulars of the kind possess to the man of science much more than a passing interest, and it is quite certain that our magazines and powder factories can never be rendered even moderately safe, until each individual cause which may lead directly or indirectly to the ignition of gunpowder shall have received a thorough, calm, and searching investigation at the hands of men qualified to deal with the acknowledged difficulties of the subject. Accurate and reliable records of the attendant circumstances of past explosions are of the highest value. They act at once as guides for the future, and afford the best of all evidence from which future deductions may be drawn. Unfortunately, as it is, such records scarcely have any existence.

The marshes at Erith in one sense form an extremely suitable locality for the establishment of a magazine. They are moderately near the metropolis, and yet so far distant that it is to the last degree unlikely that any explosion, however tremendous, could materially affect the well-being of the great city. They are also near a great shipping port, water carriage is always available, and in a word, the site holds out many advantages to the powder merchant. But it must be remembered that the marshes are dangerously near to Woolwich and Plumstead, places where very large stores of Government powder are kept; and as far as our present knowledge of the effects of concussion upon explosives tells us anything, it teaches that there is nothing improbable in the notion that an explosion at Erith might, if severe enough, be immediately followed by another at Plumstead or even Woolwich. Some six years ago the Messrs. Hall & Co., of Dartford, erected a magazine at the head of Erith-reach. We understand that a good deal of local opposition was brought to bear at the time; nevertheless the magazine was built and had been used regularly up to the moment of the explosion. Close by stood another and older structure of a similar kind, the property of the Lowood Company. They were very imprudently situated close within the embankment or tidal wall of the Thames, and from the destruction of a section of this wall very disastrous consequences would have followed but for the prompt measures taken by the authorities. Powder was ordinarily conveyed to and from the stores by means of river barges, usually worked by two men and a boy each. At about a quarter to seven on the morning of the first day of October, two of these barges lay in the stream, unloading powder brought from Faversham. A timber stage running out into the river formed a roadway along which the barrels were conveyed to the magazine in barrows fitted with copper wheels. The work was proceeding satisfactorily when the explosions took place. Whether the work of destruction commenced in the barges or on shore we cannot say. The boats have disappeared, for the present at least, as completely as though they had never existed. The second explosion, following almost instantaneously on the first, effectually destroyed the magazines and the neighboring cottages. The unfortunates in immediate propinquity have also gone to that land from which there is no return. Already some eight or nine deaths are recorded, and it is to be feared that the tale is not nearly full. The effects of the explosions were in every way tremendous; there is little doubt that they made themselves plainly felt through a radius of at least fifty miles. The consternation at Woolwich was excessive, windows and doors being blown in, and many of the inhabitants suffering severe injuries in consequence, while at a distance the general impression existed that an earthquake had paid us a passing visit. The destruction has been so complete that there is little opportunity for scientific detail, and the direction of the destroying force does not appear to have varied sensibly from radial lines proceeding from the magazine as a center. One exception exists: the mansion of Sir Culling Eardly, although very near, has suffered but a little, a gentle hill intervening between it and the seat of the explosion, which has apparently exercised a protecting influence.

Strangely enough, the quantity of powder exploded is not accurately known. At one time the report got about that not less than 30,000 barrels had been ignited. We need scarcely assure our readers that, had this been the case, not only Woolwich, but London would have been half destroyed. The Messrs. Hall state the quantity at about seven hundred and fifty barrels in the larger magazine, and two hundred in the barges, but the amount in the smaller magazine is wholly unknown. The destruction of the books and papers, and the lamentable deaths of those in charge, in some measure account for this ignorance. Still, under a proper system, it is not too much to say that particulars of every pound of powder brought in and sent out should have been accurately registered at the chief offices in Lombard and Fenchurch streets. The fact that so much uncertainty exists upon a very important point, is very fair evidence of lax discipline somewhere. In all probability, about one thousand three hundred barrels of powder exploded in all, or some sixty tuns. It is fortunate that the explosion was in some degree divided, or the results might have been yet more disastrous.

Our contemporary then proceeds to discuss the cause of the explosion, and argues that it may have been from percussion or spontaneous combustion.

Steel in Locomotive Construction.

From an interesting article on steel in the *Mechunics' Magazine*, London, we extract the following passages:—

"As would be naturally expected, the locomotive makers of the country of Krupp have been forward in the application of steel. At the last great exhibition Borsig's locomotive was particularly remarkable on this score. The cast steel he employs for the different parts of his engines is of the quality used for springs. The engine at the exhibition had its driving, coupling and piston rods, and the crank and coupling rod pins of this material, as also, we believe, the slide links and the expansion slide bars. According to a letter from Herr Borsig, published last year at Paris, in one of our foreign contemporaries, all these parts are, when forged, tempered by being heated in an air furnace to a red heat. They are then re-heated to a deep cherry red, and they are then again cooled down to the degree of consistency required for the finishing of the detail. Any bad material shows fissures or cracks that indicate at once 'a waster.' For this reason the parts are best finished after the tempering, and any warping is not to be dreaded. The tempering is also the test of the general quality of the steel, and of the security of any particular detail—an additional safety over their use compared with that of wrought-iron.

"The portable engine for agricultural and other purposes, and the traction or locomotive engine on common roads, will always be more or less similar to the railway locomotive. It is, therefore, to be expected that any great improvement in the locomotive will be followed by corresponding progress in the portable engine. The best portable engines, those of Clayton and Shuttleworth for instance, approximate the nearest to the locomotive in the make of boiler and form of working parts. Some of the makers of traction engines have turned out engines with steel boilers; but up to the present we cannot chronicle much in the application of steel to agricultural engineering. And yet agricultural engineers should, above all others, be aware of the importance of steel, as the use of the steel wire rope first made steam plowing a practical thing. We should thus be glad to see our agricultural friends making a larger use of steel than they do at present. The lessening of weight of something like at least a third that would result to the traction engine by a complete adoption of steel, ought to be of immense service in many of the circumstances in which traction engines are placed. Such would also be the case with the steam plows and scarifiers, and the draught, both static and dynamic, on the steel wire rope would be clearly very much lessened by a subtraction of useless dead weight. At least, we hope to see the larger adoption of steel on the 'racing engines' at the competitive trials of 1866. Other things being equal, the engine with moving parts of steel, and more especially if with a steel fire-box and boiler, must carry off the prize. In the first place, as the working parts would be lighter, less work would be acccordingly consumed in moving them. The economy, however, would be found in the steel fire-box, and the, perhaps, steel tubes. The sides of a steel fire-box being formed of a material practically twice as strong as wrought iron, are only about half as thick, and this tenacity results in a remarkable saving of fuel, doubtless produced by the speedier conveyance of the heat to the water. With steel there would also be a less volume of material exerting its absorbing powers on the heat generated by the coal, and tending to shorten the run of the competing engine. The steel boiler would thus tend to permit a quicker starting of the engine—a quicker rise of the steam—while the engine would also be enabled to stop rather later. Competitors at these trials are only too well aware of the advantage of thin sides; but in this case, the thinness would not be obtained at the expense of safety. There would also, no doubt, be an absolute saving in fuel, as the waste gases would probably have more of their heat abstracted before reaching the smoke-box."

The English Turret Ship Laid Up.

We regret to state that the extraordinary report relative to the *Royal Sovereign*, referred to in the *Times*, proves to be correct in all its anticipations, an order having been received by the chief authorities of Portsmouth dockyard to pay the ship out of commission, and place her in the first-class steam reserve at that port. Parliament is not sitting, and the chief members of our political Board of Admiralty are away on their combined business and pleasure trip to Malta, and, consequently, no reasons can be given officially for this seemingly inexplicable proceeding with regard to England's first turret ship; but the facts remain, nevertheless, for public consideration and discussion. The *Royal Sovereign* has been but a very short time in commission. She is a vessel of an entirely novel class, and one that from recent American naval operations we are deeply interested in testing in every respect. Her crew have not been together long enough yet to learn their turret gun exercise sufficiently to take the ship into action. The ship herself has not been tested either in her behavior in a seaway or in the working of her turrets and guns further off the land than in Portland-race. Her officers have been put each to some £50 expense in joining the ship for any ordinary term of commission; and, in fact, there are a hundred other cogent reasons against this inexplicable step of putting the ship out of commission. It is openly asserted in naval circles at Portsmouth—and that, too, without distinction of rank or position—tnat the success of the turret ship has been so marked that the advocates of the broadside gun principle, now paramount at Whitehall, have caused this order to be issued for the *Royal Sovereign* to haul down her pennant.—*London Mechanics' Magazine.*

Strength of Anchors.—The English Admiralty have lately tested a new anchor constructed on an improved plan. This anchor weighed two thousand four hundred and sixty-eight pounds, on being placed on the testing machine. The distance from the center of the pin, which fastens the shackle to the shank, to a point near the extremity of one of the flukes, was five feet and five inches. Although subject to strains varying from nine to a weight of twenty-four and five-sixteenths tuns, its deflection was but one-half inch, and the shackle yielded only one-sixteenth of an inch; at fifteen tuns it was decreased by three-sixteenths; at nine tuns the permanent set was one-eighth less; and when all pressure was removed, the original dimension was regained. The Admiralty test was twenty-four and five-sixteenths tuns; and the result was highly satisfactory.

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POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

The Association held its regular weekly meeting at its room at the Cooper Institute, on Thursday evening Oct. 20, 1864, the President, D. S. Tillman, Esq., in the chair.

STEAM PLOWING.

Mr. Thayer exhibited a model of a rotary steam spader attached to the rear of a locomotive steam engine. The spades are broad blades of thin cast steel set spirally on a cylinder, and cut the soil in slices, carrying it back below the cylinder and dropping it, bottom side up, in the rear.

Mr. Lee:—I have always believed in the practicability of steam plowing, and in common with other Americans my preference at first was for the locomotive system. In England, after taking out scores of patents and expending very large sums of money, the locomotive system has been abandoned; but the system of rope traction is a practical success. It is an established industry as a means of making money. Men of enterprise buy or build their machines, and go round from farm to farm to plow the fields.

The President:—How many plows do they work in a gang?

Mr. Lee:—From three to six. One man can guide a six-plow machine, while a larger one would require two men, and this has limited the machines to the present time to six plows.

Mr. Schuyler:—How much do they get an acre for plowing?

Mr. Lee:—Some fields have been plowed for 5 shillings English—equal to $1 25 of our money. But the usual charge is from 15 to 21 shillings—$4 to $5. They plow generally a good deal deeper than is done by horses, frequently twelve inches instead of eight, and a better crop is obtained. It is stated that the increase in the crop will average 8½ bushels of wheat to the acre.

Mr. Fisher:—What is the cost of a machine?

Mr. Lee:—From £650 to £1,500. The engine is placed on one side of the field, and the plow is drawn across by a wire rope. In some cases two engines are used—one on each side of the field; in others one engine is employed, with an anchor to hold the pulley on the opposite side of the field. Of course it takes one man at the engine and another at the anchor, besides the one who guides the plows. In plowing over a hill a pulley is placed on the summit, and a boy is stationed to move it as the work progresses.

NEW ALLOY FOR IRON.

Professor Fleury read a paper on a new alloy of copper, zinc and tin to be mixed with iron, recently patented by Mr. Arnold. It was stated that 5 to 10 per cent. of the mixture added to cast-iron increased the tensile strength of the iron several thousand pounds to the square inch, as proved by tests at the West Point Foundry.

The President:—There can be nothing new in this except possibly the proportions.

PETROLEUM BARREL.

A sample of Robinson's barrel for petroleum was exhibited. The plan of making the wood of this barrel impervious to petroleum is to soak the inside with soapsuds, and the outside in boiled linseed oil containing drying materials.

Dr. Dwinelle said that an ordinary barrel filled with naphtha would be completely emptied in two months by the passage of the subtle fluid through the pores of the wood, and that the escape of petroleum from the casks on their way from the wells to this city amounts to 10 per cent., while with this prepared cask there is no loss whatever.

The President then announced that the Association would proceed to the discussion of the regular subject of the evening—

FURS AND THEIR PREPARATION.

Dr. Parmelee:—In the prepared state the skins are called fur; but without preparation they go by the common name of peltry.

In Russia, Poland, East Prussia, Hungary, Bohemia and Saxony lamb skins constitute an essential part of the dress of thousands among the lower classes, and the skins of various other animals may be considered as articles of absolute necessity.

So early as the sixth century the skins of sable formed an article of fashionable attire at Rome, and were brought from the confines of the Arctic Ocean, at great cost, to supply the demand of that wealthy capital.

The traders of Italy brought a considerable supply of fur to England in the time of George III. So much so that this monarch prohibited their use except among the wealthy classes.

The Canadian fur trade was commenced by the French, soon after their settlement on the St. Lawrence. The company formed in London, and called the Hudson's Bay Company, was chartered by Charles II., in 1670. This prosperous company founded many establishments, and carried on its trade for more than a century, when it met with a powerful competitor in the form of a new company composed of wealthy and influential British settlers in Canada. This second company was called the North-West Company, and its chief establishment was at Montreal, though trading upward of 4,000 miles further to the northwest. After long duration the two companies united into one, under the name of the Hudson's Bay Fur Company.

The Indian trade of the great lakes, upper Mississippi, etc., was enjoyed by the North American Fur Company, having its chief establishment at New York. Important as is the trade of these companies, yet the most costly and highly-esteemed furs are furnished by the trade carried on by Russia. The ermine is one of these, a fur which is produced in many countries, but only in perfection in Russia, Sweden and Norway.

The colder the climate the finer and warmer is the fur of animals. The finest furs are therefore brought from the colder regions.

The effect of cold on the Hudson's Bay lemming was made the subject of an experiment during Ross's voyage. The little creature was kept in a warm cabin during several months. It retained its summer fur. It was then exposed on deck, at night, to a temperature of 30° below zero. After one night's exposure, the fur on the cheeks, and a patch on each shoulder, had become perfectly white. On the second day those patches had extended, and the posterior part of the body and flanks had turned to a dirty white. During the next four days the changes continued, and at the end of a week the animal was entirely white. On examining the skin it was found that all the white parts of the fur were longer than the unchanged portion, and that ends of the fur only were white so long as they exceeded in length the dark-colored fur. By removing these white tips with a pair of scissors the original dark summer dress appeared.

The fur of the ermine ranks first in value; and the older animals furnish the best. These little animals are caught in snares and traps, or by shooting with blunt arrows. The skins are sold in lots of 40, called "the timber."

Next in value are Russian sables. The length of the animal is from 18 to 20 inches. The darkest in color are considered the most valuable. The produce of Russia in these skins is about 25,000 annually.

A great quantity of mink skins are sold to the inexperienced as real Russian sables.

There is also an inferior sable called Kolinski or Tartao sable procured from Russia. This fur when dyed is sold among inferior sable.

Next to the sable in rarity and cost comes the fur of the silver fox, which is a native of the country below the falls of the Columbian River, in Washington and Oregon Territories.

The softest and most delicate fur is that of a little animal called the chinchilla, about the size of a small squirrel, which inhabits Peru and the northern parts of Chili.

The sea otter has a very fine, close, soft fur; jet black in winter, with a silken gloss. That of the young animal is a beautiful brown.

The Persian lamb-skins have a soft, compact and elastic wool, which is formed naturally into elegant curls or waves. When killed immediately after birth, or taken from the mother, they are still more beautiful and expensive. These skins have been considerably used in Europe, but not yet in this country. A few have been very recently imported. The most prized of these skins are the fine black.

The sloth has a beautiful fur of a high luster.

Mr. Lusac, of this city, an elderly and intelligent merchant in furs, informs us that the Germans excel all others in dressing and manufacturing furs, in a general regard. But furs, he adds, are put up in New York which are not excelled by any in Europe

The Chinese possess arts connected with the dyeing of furs, as well as in the preparation of skins, which would command a large price if they could be transferred to European or American artizans.

The dyeing of furs may be considered the most difficult part of their preparation. It requires the most careful and skillful manipulation. Mr. Aphold, of London, England, has gained much repute for his skill in dyeing brown, which is a difficult shade to attain.

Otter fur has been dyed in New York better than in Europe. Muskrat is dyed to imitate mink; also to imitate the German fitch. Opossum is likewise thus dyed. Sable fur is frequently dyed to improve its shade.

The furs of the gray fox and of the wolf are difficult to dye.

An objection to the fur of the Norwegian and Lapland dog is a peculiar odor that always attends it.

The skins of hares and rabbits are used, in common with beaver and many other skins, for felting purposes. And this branch of the manufactury of furs is a very interesting one.

The introduction of silk plush for hats, as substitute for beaver, has brought about some curious changes in the fur market; for example, in 1827, 1828 and 1829 mink skins were worth in New York from 37 cents to 40 cents each. Now these skins are worth from $8 to $9. Muskrat skins were then worth 50 cents each and are now worth about the same.

The first process in dressing furs for use belongs to the hunter, who, on capturing the animal, strips off the skin and hangs it up to dry in the open air without fire. If it is well dried, and carefully packed, it reaches its destination, however distant, in good condition; but, if any moisture be left, or, if it be packed with others imperfectly dried, so that the slightest putrefaction takes place, then it is unfit for use, so far as the furrier is concerned. A minute examination of the skin is, therefore, his first business. The next step is to cleanse them from greasiness. This is accomplished by the use of water, bran, alum and salt. A kind of oil which is found in the fur itself is not wholly removed by the first treatment, so that it is necessary to afterwards wash it with a solution of soda and soap. Finally, the skin is well washed in clean water and dried; the previous treatment having converted the skin into a kind of leather.

The cutting up of the skins requires much judgment to avoid waste. The refuse cuttings if not cut to waste are available for making articles of the less costly description. And it has been remarked that many a lady on having her furs fresh lined under her own superintendance has viewed with surprise approaching to dismay the elaborate patchwork which the skins present on their inner side.

Skins to be used in felting undergo a longer treatment. And by means of ingenious machines the fur and hair is not only separated from the skin, but the hairs are separated from the fur; and even the fur itself is assorted into quantities of like specific gravity.

The use of fur in an economical and sanitary point of view is a subject on which there would probably be a great diversity of opinion. It is remarkable that in some countries the custom regarding clothing differs materially from ours. We dress warmer when we go out than when we sit in the house; the Turks, who seldom have fires in their apartments, use warmer clothing than when they go out, considering the exercise of moving about as a source of warmth. The Chinese are said to practice the same custom.

The President:—The pioneers of the fur trade in this country were John Jacob Astor and Peter Smith. On retiring from the business Smith invested large sums in the wild lands of this State, which he bought at the sales for taxes, while Astor invested in New York City lots. The result was that Smith became the largest landholder in the country and Astor the richest man. Peter Smith was the father of Gerrit Smith.

The subject of furs was continued for the next evening.

THE gunpowder explosion at Erith, England, on the 1st of October, was heard ninety-four miles.

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FARMERS' CLUB.

The Farmers' Club of the American Institute held its regular weekly meeting at its Room at the Cooper Institute, on Tuesday afternoon, Oct. 25, the President, N. C. Ely, Esq., in the chair.

THE USEFULNESS OF BIRDS.

Mr. Robinson read a communication from the Rev. Mr. Weaver saying that his trees had been unusually free from canker worms, and he attributed it to the presence of large numbers of reed birds.

Dr. Trimble:—Mr. President, I must say a word for the reed bird. Were it not for birds we could not live; insects would destroy the whole of our grains and fruits. One of the most valuable of all is the reed bird. When I see bunches of these brought into our markets in the fall I am pained and grieved. It does not eat the curculio, but it eats the canker worm and it eats your span worm that gets on the trees in this city. Last spring I was standing with a friend by Madison Square when he called my attention to the great numbers of reed birds in the trees. We watched them, and they continued to come till there were 300 or 400 of them in the square. They were feeding on the span worm, and it was curious to watch their mode of feeding. They could not rest on the slender ends of the branches where the worms were, and they would flutter off in the air and approach the worm till they could catch him with their beak. The worms seemed to have an instinct that their enemies were after them; they felt a jarring of the limbs, and they began to let themselves down by their webs in hundreds. The reed birds are not fly-catchers like the king bird and the swallow, and they could not catch the worms while suspended thus in the air.

Mr. Marshall:—Is the reed bird the little black bird that comes in flocks?

Mr. Robinson:—No, it is the cherry bird.

Dr. Trimble:—The male is marked with yellow on the tips of its wings, and it has a crest on its head which it can raise at pleasure.

Mr. President, I have devoted all of my leisure this summer to dissecting and examining the crops of these insecticverous birds, and I have no doubt that if a knowledge of their usefulness could be spread throughout the community, it would result not only in laws for their protection, but in a public sentiment also which would enforce these laws. The most valuable bird that we have is the Baltimore Oriole. That eats the curculio, the great destroyer of our fruit.

Several other subjects were discussed, but we select the above only for our columns.

Sharp Practice at the Oil Wells.

The *Philadelphia Ledger* has the following interesting statement in regard to oil:—

"The next Legislature will, we suppose, have to make some new laws on a subject in regard to which the past history of jurisprudence can afford but little guidance, while the principles of justice involved are in some parts very clear, but in others remarkably doubtful and complicated. We allude to the equitable rights of owners of oil wells and the proper manner of protecting one person or company against the injuries which may be easily inflicted upon them by a neighbor, without violating any law at present on the statute book.

"If a man in a city owns a house, and because he owns it, chooses to set it on fire and make a bonfire of it openly, though he may cause the destruction of no life nor defraud any insurance office, nor injure any one besides himself, it is a punishable crime, and if his neighbor's property is thereby burned it is arson. But at the oil wells nothing is better understood than that two neighboring oil companies will, in many cases, willfully and maliciously flood each other's most productive wells for the sake of procuring a lucrative compromise. And when two large and profitable companies quarrel it is a sort of war among the gods, and the stockholders and small fry get out of the way. Down goes the stock twenty or thirty per cent, and when a compromise is effected up it goes again. A few days ago the *Pittsburgh Commercial* thus noticed a making-up of matters—not, perhaps, of precisely the kind to which we allude, but nearly enough to give the idea:—

Dalzell, which a few days since was dull at 8¼c., sold freely to 9c., and many holders refused to sell at 9¼c. It is said that a long pending controversy between this Company and the Columbia, arising out of their wells interfering with each other, has been adjusted, and that both will now realize a large increase of oil.

"Many of the best wells tap the same underground current of oil, and these can be easily made to injure one another most vitally. When a well is put down, it passes through many currents of water before it comes to the oil, but this is prevented from doing injury to the well sunk, by an iron tubing like gas pipe, each joint screwed into the other as it is let down. But in spite of this water would run down outside of the pipe and choke up the well and spoil it, but for a leather bag fastened round the pipe and made water-tight. This bag is filled with linseed, which swells after it is down below all the seams of the water, and renders it impossible for the currents to run down beside the tubing. If at any time the tubing is drawn up, however, down rushes the water, and thus not only one well, but all the wells connected with it, become flooded, and pump nothing but water.

"Now there are some proprietors whose wells do not pump much, but these underground streams of oil connect them with rich flowing wells, and they draw their tubing on purpose, by flooding their neighbors' wells and making them worthless, to force a compromise by which the products of the good well and the poor one shall be equally divided. In equity this is about as if one neighbor should say to another, 'Your barn is full and mine is empty; go shares, or I will set fire to mine, and the sparks will consume yours.' But there is no law against this sort of underground work of revenge and destruction, as there is against arson, nor in the nature of the case can there be one so easily framed, because it is often really necessary for the proprietor of an oil well to draw his tubing to alter the working of his pumps, or else to lose all benefit from his well. You cannot, therefore, prove the malicious intention as you can in arson, and each man is therefore presumed to have a right to draw his tubing without interference, especially in the absence of law.

"The case, therefore, comes nearer to this. In a city one man, by pulling down his house to rebuild, will often cause the destruction of his neighbor's house, especially if he goes on to deepen his own foundation below it. Just so far as he is obliged to avert injury from his neighbor in the one case, so it would seem he ought to be restricted from flooding his neighbor's well in the other, especially where malice is presumable. But how to frame laws equitably and practically efficient to effect a remedy for these deep underground wrongs, it is difficult to see. A new Solon and a second Daniel come to judgment would seem requisite."

Whistling Bullets and Blazing Cartridges.

The correspondent of the *Philadelphia Inquirer* writes from before Petersburg as follows:—

The other day Colonel Brewster, commanding the work, observed one of the men intently at work on a nondescript missile. He had run several bullets until he had got one nearly as long as his finger, and in this he was laboriously cutting notches along its entire length. The curiosity of the Colonel was excited, and he inquired—*cui bono?* "I'll show you directly Colonel," was the reply, and he did so, finishing his work; at last he loaded his gun in the usual way, and then put his nondescript on top of it. Pointing his gun rebelwards he fired, and his load went whirring and whizzing with very much the noise of a good sized shell. "There," said the soldier, with intense satisfaction, "I've had a little shelling on my own account, and skeered them fellers over yonder." And undoubtedly some rebel had "ducked" when he heard the noise of that decidedly harmless "shell."

They have a practice along our lines of getting up impromptu fireworks after this wise:—A soldier puts in his cartridge, and then a second one, the powder of which has been wet. The gun is fired, and the wet powder of the extra cartridge goes flying through the air very much like a comet with an abbreviated but exceedingly brilliant tail. Out of this, although the first bullet, or even the second, may carry death or mutilation across the rebel parapets, our boys extract a prime article of fun.

THE great engines of the *Dictator* made over 30 revolutions with ease, lying at the dock.

Grant's Railroad.

Who but a parcel of Yankees would ever have thought of building a railroad along the battle-line of an army, with one termini the outer chain of fortifications? These Yankees who have settled around Richmond have done this thing. The railroad goes over the ground with a most sublime indifference to its ups and down. If you are seated in one of the last cars of a long train, half the time the locomotive drawing you is out of sight over a hill; but the best of all is the covered way, where the road runs through the field near Hancock, under the fire of the rebel batteries of Whitworth guns on Cemetery Hill. The rebels used to amuse themselves by shelling the trains. They never did any damage, but it was judged best to make sure against mishaps, and so a breastwork for the railroad was thrown up across the entire field. Down into the cut goes the train, and whirls safely under the friendly cover of earth to beyond the point of danger. With all its goings up and comings down, with all the instability of its roadway, there has never been any accident on the road, no train ever collided, none have ever got off the track. The railroad is a great thing.

Erosion of Lead by Insects.

The fact that there are insects of different species which bore into lead has been heretofore known, but a correspondent of the *London Times* recalls attention to the subject in a *resume* of proceedings as to it in the *Comptes Rendus*. The insect which bored French bullets in the Crimea was not known in Russia, but is said to be common in the Jura, in France, and in Germany and Sweden, as well as in England. It is a wood insect, and usually attacks silver firs and pines. It is the larvæ of the insect which attacks the lead—not the perfect insects, which die in the excavated passages even immediately after the metamorphosis, as very often occurs with insects in general. Roof and other sheet lead has been known to be bored by a species of Bostriche (*B. Capucina*). The *Sirex gigas* also often cuts its way into lead by means of its mandibles, as also the *Callidium sanguinum;* and lead pipes have been perforated by an insect named *Apate humeralis*. The mandibles of some of these insects consist of a saw, toothed and cut like a file. Perforations in lead ascribed to corrosion may sometimes be the product of the mischievous industry of such insects.

India-Rubber Packing for Stuffing Boxes.

The stuffing supplied by Unger's India-rubber manufactory, Berlin, consists of washers of various diameters, made up alternately of layers of sail-cloth and vulcanized India-rubber, rolled together and compressed in a compact mass. By using this packing, the irregularities in the motion and the escape of steam attending the application of the common hemp packing are entirely suppressed. Its durability is four or five times, its price about twice, that of the common packing. Herr Jacob, engineer of Hettstadt, has applied this packing with great advantage to a 20-horse power steam engine, working at a pressure of about 25 lbs. per square inch, and making 14 or 15 revolutions per minute.

[Similar packing has been used here for years.—EDS.

STORING POTATOES.—Dig the potatoes in fair weather, sort out such as are desired for table use next season, and put them in boxes or barrels, filled in among the potatoes with dry sand or fine dirt. Keep them in a dry cellar where they will not freeze, and in the spring when they start their sprouts, turn them out, take off the sprouts, and then put them back in the boxes.

STEAM ENGINES IN PRUSSIA.—From an official return recently issued it appears that the total number of steam engines at the end of 1862 was 8,653, with 365,707 horse-power, showing an increase of 5,821 engines and 273,243 horse-power, as compared to 1852, when there were only 2,832 engines, with a total of 92,462 horse-power.

The terror of the desert of Sahara is being removed by the application of science. In 1860 five wells had been opened, bringing fishes to the surface from a depth of 500 feet. Vegetation is springing up around the wells, and the "desert will blossom like the rose."

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Correspondence

"Dry-Printing" Greenbacks.

Messrs. Editors:—Having been behind the scenes, and having full information respecting the history and success of the "dry printing" experiment, I beg you will allow me to describe the process. What the Hoe press is to the old hand-press of Franklin's time, the hydrostatic press at the Treasury Department is to the hand-press of the American and Continental Bank-Note Companies of to-day. In all sincerity, I confess to a full belief in the practical possibilities of dry printing by hydrostatic power; but while I believe thus, I cannot be blind or unmindful to the facts actually accomplished, for they are vastly less than the public has been led to suppose. Good printing can be done by the process. This is the first desideratum; but the other one, of speed, is unattainable, or at least problematical at present. An article in the *Cincinnati Gazette* on this subject says:—

"Preparations are being made to substitute dry printing for wet, by which there will be at least two advantages gained—speed and better work." "By the present process of printing, each pressman takes about 500 impressions per day. By the hydrostatic presses it is expected that from 300 to 500 impressions per hour will be taken."

It is true that preparations have been made for a long time past; but the end is not yet, nor is the substitution likely to take place this year, for there are more obstacles in the way than the sanguine projectors happened to see. There is no lack of pressure necessary to print, and hence good printing can be done; but when we come to the question of speed on a large scale with a large number of presses, there will be an enormous expenditure of power necessary to do the work; that expenditure will be out of all proportion to the work accomplished. There are other drawbacks to fast printing by the dry method, which are these:—Toughness of the ink suited to the process; extra motions to perform in putting the plate (after it is wiped) upon the chase, and the paper upon the plate; to let the chase-frame down to the work; then to push the chase under the press. The pressure having been drawn, it has to be pulled out, the frame raised, paper taken off, and the plate lifted to the stove again. These extra motions are not laborious for a single impression, but they count largely in a day's work. The third drawback is the necessity of a renewal of the rubber in the chase-frame just mentioned. This rubber will last to make from 200 to 800 impressions, depending upon the quality of the rubber and how the printer wipes his plate—if close, less; if full, more, as the pressure in each case must be increased or diminished in proportion, or else the work will be either light or mashed in appearance. The greater the pressure the sooner the rubber requires renewal. To do this requires from 20 to 30 minutes' time, meantime the printer and his valve-tender has a rest. This has to be repeated every 400 impressions, for instance, and, according to report, this is about the average number the press will turn out, so that at the end of every hour's work 20 to 30 minutes must be spent in waiting, which will allow of only six hours of actual labor for a day of eight hours, thus making a loss of 25 per cent in time alone. Now, if the eighty presses mentioned were to be used for one year, the loss in time would amount to nearly $100,000.

As before remarked the speed of the dry printing process has been vastly overstated. To my certain knowledge, not more than 75 good impressions per hour can be turned out by this process, and up to date not more than 400 per day have been struck off. This makes an average of only fifty impressions per hour. This duty is being performed under favorable circumstances, there being only a few presses at work. Set them all at work, and there will be a falling off in the amount of work, if not in the quality. These large calculations as to speed are mathematical calculations. They should have been mechanical, allowing a deduction of fifty per cent for friction and other hindrances. Then we should come nearer the amount of work the system is capable of turning out.

We are also informed in the article alluded to previously that pumping machinery is being fitted up, and that all will soon be in motion. The said pumping machinery has been rigged and re-rigged a multitude of times; but it has had a very bad habit of bursting or breaking, so much so that the machinists on the work became heartily sick of it. And it is believed that if the Congressional Committee had known the facts in the case, and had been guided by those facts alone, their investigations into that branch of printing would have resulted in its condemnation. It is also stated that eminent men in science and mechanics had been consulted to test the feasibility of the process. This is undoubtedly true in this sense. The plan may have been submitted, but it was tested to little purpose, if we are to judge by the results that have followed its actual working. Of the eighty presses contracted for and built according to that plan, not one is strong enough to stand the required pressure; and over one-third of the number have already burst. The first receiver was a failure from a like cause, and the pumping machinery is but little better, it being too light, the pumps too small and numerous, and withal running too fast

Hydrostat.

West Paris, Me., Oct. 9, 1864.

Feeding Gold Fish.

Messrs. Editors:—Having noticed in your paper of October 15, 1864, a communication regarding the keeping and feeding of gold fish, I feel inclined (being somewhat experienced) to give you some information on the subject. With reference to the keeping of gold fish; I may state that I have a common pine tank (about three feet in length and two feet in width, being two and one-half feet deep), which holds some thirty gallons of well water, with which it is kept constantly filled. As "your correspondent" makes no allusion to his method of keeping gold fish, I am in doubt as to whether my plan will suit him. However, about the middle of June, 1863, I placed in this tank, which stands in an exposed situation, about forty fish (twelve or fifteen of them gold fish, and the remaider "turners," a fish which, when taken from the pond, is similar in color to the cat fish or bullheads, but which ultimately turns as brilliant a gold as its companions, hence the gold fish with black backs), which, with the exception of a few, are all alive, and since the time I put the fish into the tank the water has been changed but twice; once last winter, when I put the tank in the cellar, and once this spring, when I brought it out again. And, what is more remarkable, the fish have not been fed since June, 1863. But on the inside of my tank is a green, slimy moss, that, by decomposing the water, supplies oxygen to the fish during the day, and at night absorbs the carbonic acid gas, which the fish have given forth. If your correspondent will regulate the number of his fish to the quantity of water in which he keeps them (say two small fish or one good sized one to a gallon of water), and if instead of cleaning the sides of his tank he allows the green confervae to grow, he will find that nature will provide better food for his fish than anything he can give them. Such is my experience; but the writers say that "feeding is a very important matter; it should be performed twice or thrice a week at least. Bread and hard-boiled eggs are good staple food; but flies, small spiders, and any soft insects will be greedily accepted and demolished in a general scramble. Food not eaten should be immediately removed, or the water may get tainted; and care should be exercised not to overfeed at any one time, and not to feed too frequently. F. T.

Bay Ridge, L. I., Oct. 17, 1864.

[The oxygen furnished to the fish by the plant comes from the decomposition of carbonic aid, not from the decomposition of water.—Eds.

Current Expense of Hill's Telegraph Battery.

Messrs. Editors:—A few months ago you published an illustrated description of a telegraph battery invented by Dr. E. A. Hill, of Galesburg, Ill. This battery has been in use on the Burlington and Missouri River Line for the past ten months, and I would like to make a statement of its economical working for the information of telegraphers and electricians generally.

The line at present extends from Burlington to Ottumwa, Iowa, a distance of 75 miles, and has seven offices in circuit. This line was fed for six months by a battery of 26 cups at Burlington, but for four months past an additional section of 14 cups has been used at the Ottumwa terminus, making a total battery power of 40 cups. The expense for 10 months of the Burlington battery by careful estimate may be stated as follows:—

60 lbs. sulp. copper at 19, 20 and 25c. per lb.	$11 70
17 lbs. zinc at 20c. per lb.	3 40
Total for ten months	$15 10

This is at the rate of $1 50 per month, or about 5 7-9 cents per cup per month.

The battery at Ottumwa cost 5 11-14 cents per cup monthly. The battery evolves a remarkably steady and reliable current, and is not perceptibly injured by "short circuits" and ground connections in its immediate neighborhood, and is capable of feeding eight or ten different circuits constantly.

Permit me to suggest that superintendents and engineers of the different lines in the United States and Canadas be requested to furnish expense estimates of the various batteries in use, for publication in the Scientific American, as your paper is read generally by telegraphers throughout the country. It is very desirable, especially during the present high prices, to ascertain the most economical and reliable battery power in use. Reports from the various lines would prove a stimulus to inventors, and be of great benefit to telegraph interests.

Jno. L. Waite,
Supt. B. and Mo. R. Telegraph.

Burlington, Iowa, Oct. 19, 1864.

Every One to His Own Trade.

Messrs. Editors:—Allow me to differ with your correspondent in relation to "Boiling Clocks." His idea strikes me as being simply ridiculous. A timepiece, either watch or clock, should not be tampered or fooled with, but should, in order to keep correct time, receive the best of care. Let us grant that the boiling will remove grease; yet all the dirt and dust which boiling will not dissolve still remains in the pivot holes and leaves of the pinions, and can only be removed by "pegging" them out, which cannot be done while the clock is together. Then again, three-fourths of those that undertake to boil their clocks would leave them damp, so they would rust, while one-half of the remaining fourth would heat them so much in drying that the temper would be spoiled, thereby being "penny wise and pound foolish." It seems to me that a person can afford to pay 75 cents to have a clock that serves him faithfully night and day cleaned once in two years. I would, therefore, recommend all persons wishing their timepiece cleaned to carry it to some good workman, and have it done as its merits deserve. And all person wishing to obtain patents and have the papers made out correctly, not to undertake to do it yourselves, but to apply to the Scientific American Patent Agency. Such is the advice of

An Old Watch and Clockmaker,

who does not believe in "biled" clocks, botched-up patents or quack doctors.

Hartford, Conn., Oct. 17, 1864.

Another Query About a Wheel.

Messrs. Editors:—In experimenting on the pendulum for the purpose of securing some practicable method of making it perfectly isochronous, I was led to try a simple wheel rocking back and forth upon a smooth, hard surface. As this motion would give me the cycloidal or isochronous curve, I had hoped it would produce or approximate regularity in its beats. To this end I took two small, thin wheels, beveled their edges, and fastened them at a small distance apart, so that they would not fall down, and, after loading them on one side to make them slightly eccentric, set them in motion upon a plate of glass. I soon found, however, that their motions were not of a uniform length in time, and, moreover, they did not continue in motion more than two minutes.

Not feeling satisfied with this result, I took two

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other wheels of the same size and weight as before, and joined them together at one edge by a hinge. I thed gave them an angle of about 12 degrees, and set them in motion as before, when I discovered that their beats were not only more nearly isochronous than in the first case, but that the vibrations continued for nineteen minutes. And now I should like to know the reason for this disparity in time. It cannot arise from excess of friction in the first case, because the surface exposed to the glass was nearly the same in the last experiment. Does it arise from the peculiar arcs described by the wheels in their vibrations back and forth? and if so, what are its properties? Is there any angle at which they might be placed that their beats would become isochronous? Can any of your readers tell?

A. S. C.

Formula for Cutting Screw Threads.

MESSRS. EDITORS:—On page 198, present volume, you ask "for methods for calculating change wheels for cutting screws, both fractional and even pitches." For the benefit of your machinist subscribers I send you the following simple and correct rules:—

FOR SINGLE GEARED LATHE.

Divide the number of threads you wish to cut (to the inch) by the pitch (number of threads to the inch) of the feed screw, and multiply the quotient by the number of teeth on the driving wheel, and the product is the number of teeth on the wheel driven.

Examples.

To cut 9 threads, pitch 5, driving wheel 25 teeth.
$\frac{9}{5}=1{\cdot}8\times25=45$ teeth on the wheel driven.

To cut $9\frac{1}{2}$ threads, pitch 5, driving wheel 20 teeth.
$\frac{9{\cdot}5}{5}=1{\cdot}9\times20=38$ teeth on the wheel driven.

To cut 10 threads, pitch 6, driving wheel 30 teeth.
$\frac{10}{6}=1{\cdot}666666\times30=50$ teeth on the wheel driven.

To cut $10\frac{1}{5}$ threads, pitch 5, driving wheel 25 teeth.
$\frac{10{\cdot}2}{5}=2{\cdot}04\times25=51$ teeth on the wheel driven.

FOR DOUBLE GEARED LATHE.

Divide the number of threads you wish to cut by the pitch of the feed screw, and multiply the quotient by the product of the number of teeth on the driving wheels; then any divisor that leaves no remainder to this product is the number of teeth on one of the wheels driven, and the quotient the number of teeth on the other wheel driven.

Examples.

To cut $9\frac{1}{2}$ threads pitch 4, drivers 40 and 48 teeth.
$\frac{9{\cdot}5}{4}=2{\cdot}375\times40\times48=\frac{4560}{38}=120$. Or,
$\frac{9{\cdot}5}{4}=2{\cdot}375\times40\times48-\frac{4560}{60}=76$.

We get 38 and 120, or 60 and 76 for the number of teeth on the two wheels driven.

To cut $10\frac{1}{5}$ threads, pitch 4, drivers 24 and 30 teeth.
$\frac{10{\cdot}2}{4}=2{\cdot}55\times24\times30=\frac{1836}{36}=51$, we get 36 and 51 for the number of teeth on the two wheels driven.

To cut 3 threads, pitch 4, drivers 24 and 30 teeth.
$\frac{3}{4}=\cdot75\times24\times30=\frac{540}{20}=27$, we get 20 and 27 for the number of teeth on the two wheels driven.

To cut 10 threads, pitch 6, drivers 24 and 30 teeth.
$\frac{10}{6}=1{\cdot}66666\times24\times30=\frac{1400}{35}=40$, we get 35 and 40 for the number of teeth on the two wheels driven.

P. GOLAY,
Mechanical and Civil Engineer.

Lima, Ohio, Oct. 17, 1864.

Tumbling of Projectiles.

MESSRS. EDITORS:—In your issue of the 8th, in an article, signed Thomas Taylor, on the tumbling of projectiles, he says Hotchkiss' projectiles can be made to tumble at will by increasing the charge, and that the Hotchkiss shell is broken up by high charges from a very different cause, but the cause he fails to give.

He says the Hotchkiss projectile can be made to tumble at will by using heavy charges of powder. That was the case with large projectiles, on account of lead being too soft. We now harden the lead on our large projectiles, and they cannot be made to tumble with any charge that is safe to put in the gun.

Our projectiles breaking was from the same cause—soft lead. Whenever the lead would not hold on to the grooves of the gun, the shells were drawn apart on leaving the muzzle, and it was supposed they were broken when they were only drawn apart; but since we commenced hardening the lead bands that difficulty is obviated, and they never tumble or break.

We are constantly practicing on projectiles and making improvements, and will guarantee that not one shell in five hundred will tumble when properly loaded in the gun. HOTCHKISS' SONS.

Bridgeport, Conn., Oct. 24, 1864.

Effect of Hot Water on Tempered Steel.

MESSRS. EDITORS:—I have noticed in your current volume, No. XVI., page 246, "Caution in Boiling Clocks," where you said it would be interesting to have the experiments repeated which your correspondent referred to. I will give you my experience in the matter:—I saw two gun-locks placed (full cocked) in hot water, to clean them, where they were left several days. When taken out I discovered both mainsprings broken, and both in precisely the same place. This led me to try the following experiments:—

I took four bayonet blades with a good spring temper, and sprung them bow-shaped. I then placed two of them in strong hot soda water, and the other two I hung up in the shop where I work. In three days' time three of them were broken. Those in the water both broke on the fifth day, and one of the others broke on the fourth day. The other is not broken yet, it being now nearly eight weeks since it was sprung in that shape. I am satisfied, with these and other experiments which I have tried, that hot water does not affect a piece of spring-tempered steel. LUKE CHAPMAN.

Collinsville, Conn., Oct. 18, 1864.

The "New" English Steam Engine.

MESSRS. EDITORS:—In your issue of Oct. 29th, under the head of Foreign Intelligence, and entitled "Another New English Steam Engine," I notice the following, viz:—"A new steam engine has been invented by Messrs. Martin & Hodgson, of Manchester, England, which has two pistons in each cylinder on a vibrating shaft, just as a door swings on its hinges," etc., etc.; and then you add, "This engine, or its principle, was designed by Captain Ericsson many years ago," etc.

Now I think the credit of this invention belongs of right to me, as the patent No. 41,091, issued on the 4th of January, 1864, and which you obtained for me, will show. The wording of the claim being as follows:—"The combination of the quadruple induction valves, and the quadruple eduction valves, with the abutments, oscillating pistons, shaft and cylinder, in the manner, etc., to be used either as a steam engine or pump." By giving the above insertion you will do an act of justice, and oblige, etc.,

J. WYATT REID,
Brooklyn Steam Engine and Boiler Works.

[Mr. Reed's engine is doubtless an original conception *with him*, but our statement was correct; the principle of the English engine alluded to was designed by Capt. John Ericsson, and put in operation on the U. S. steamer *Princeton* in 1843. Drawings and full descriptions of these engines may be found on pages 43-51 of *Stuart's Naval and Mail Steamers of the United States*.—EDS.

The Motion of a Bird's wing.

MESSRS. EDITORS:—I noticed in the communication of J. E. Gillespie, in this week's number of the SCIENTIFIC AMERICAN, he states that the "stroke of a bird's wing is always at right angles to the line of elevation," and that "for horizontal flight the front edge would be elevated above the back edge." Now it seems to me that if that is the case the position of the head and tail should be reversed, for the flight would be backward.

Boston, Oct. 17, 1864. F. S. COBURN.

[Mr. Gillespie says that this is the common idea, but it is a mistake; that if the wings were inclined forward the bird, in attempting to fly, would pitch right down to the ground.—EDS.

To Soften Old Putty.

MESSRS. EDITORS:—Herewith I send you a plan to soften old putty. Having tried it several times I know it is effectual. Take a common poker, at a dull red heat, and move it slowly over the old putty, say at the rate of two feet per minute, and you can easily cut it off with a pocket-knife. H. W. S.

Cincinnati, Ohio, Oct. 24, 1864.

Purity Test of Air.

MESSRS. EDITORS:—While in our densely crowded and often sickening public rooms, I have wished that there were something to indicate the proportion of oxygen in the air, just as the thermometer shows the temperature. It has occurred to me that if a gas-light were allowed to have only a limited supply of air, its brightness would serve as a measure of the share of oxygen.

Will not some of your readers consider this matter and make such a desirable invention. It might be called a "Zoometer"—a measure of the *life* in the air. D. P. F.

New York, Oct. 14, 1864.

"A Vote of Thanks."

MESSRS. EDITORS:—I received your letter some days since, informing me that a patent was granted me for my improved device for preparing meats for cooking. Please accept my sincere thanks for your kindness and promptness in obtaining the abovs, and for all other favors. I have six or eight more inventions, for which I shall seek to obtain patents through your assistance. I constantly recommend your firm to all I see as the best of friends to and faithful attorneys for all inventors.

GEORGE W. PUTNAM.

Detroit, Mich., Oct. 24, 1864.

Centrifugal Wine Press.

M. A. Rheiler, of Stuttgard, has applied the centrifugal drum, such as been used for expelling water from sugar in sugar refineries, to extracting wine from grapes. The grapes are placed in a drum, the periphery of which is formed of sheet-iron punched full of small holes, and the drum is then caused to rotate 1,000 or 1,200 revolutions per minute. The centrifugal force drives the wine through the holes, while the skins and pulp are retained within. It is stated that the yield of juice by this process is one-seventeenth more than is obtained by the best presses, that the juice is more perfectly separated from the albuminous matters contained in the grape, that the greater absorption of air causes a more rapid fermentation, and that the wine becomes clear and ready to bottle much earlier.

We take these statements from *Le Genie Industriel*. Would it not be worth while to try this apparatus in place of a cider press?

DAY AND MARTIN'S BLACKING.—According to Mr. W. C. Day, the method of making the famous "Day and Martin's" blacking is as follows:—The bone black, in a state of powder, is mixed with sperm oil until the two are thoroughly incorporated. The sugar or treecle is then mixed with a small portion of vinegar and added to the mass. Oil of vitriol is next added, and when all effervescence has ceased, vinegar is poured in, until the mixture is of a proper consistence. This constitutes the liquid blacking of Day and Martin.

IRON SLAG FOR PAVEMENTS.—*Le Moniteur des interets Materiels* says that the waste slag from reducing furnaces is found to be an excellent material for paving streets. It is run into molds so as to form large blocks, and allowed to cool slowly. It has been tried in Paris, and several Belgian establishments have commenced the manufacture of it. One great advantage is that it does not become polished by use.

INSTRUMENT FOR TRANSPLANTING TREES.—M. Douay-Lessens, of Valenciens has invented an apparatus for transplanting trees. *Le Genie Industriel* says that it consists or a cylinder cutting at the base, with two circles arranged to enable the mass of earth about the roots to be removed with the tree. The description is not quite intelligible to us, but this mention may prove a valuable hint to some of our readers.

REMOVABLE HORSE-SHOES.—*Le Genie Industriel* says that two horseshoers of Paris, M. Lefevre and M. Guerin, have invented a horse-shoe to be attached temporarily by any traveler whose horse should cast a shoe on the road at a distance from any black smith's shop. It is fitted with straps by which it may be readily secured to the foot. The inventors suggest that it will be found convenient for cavalry on a march.

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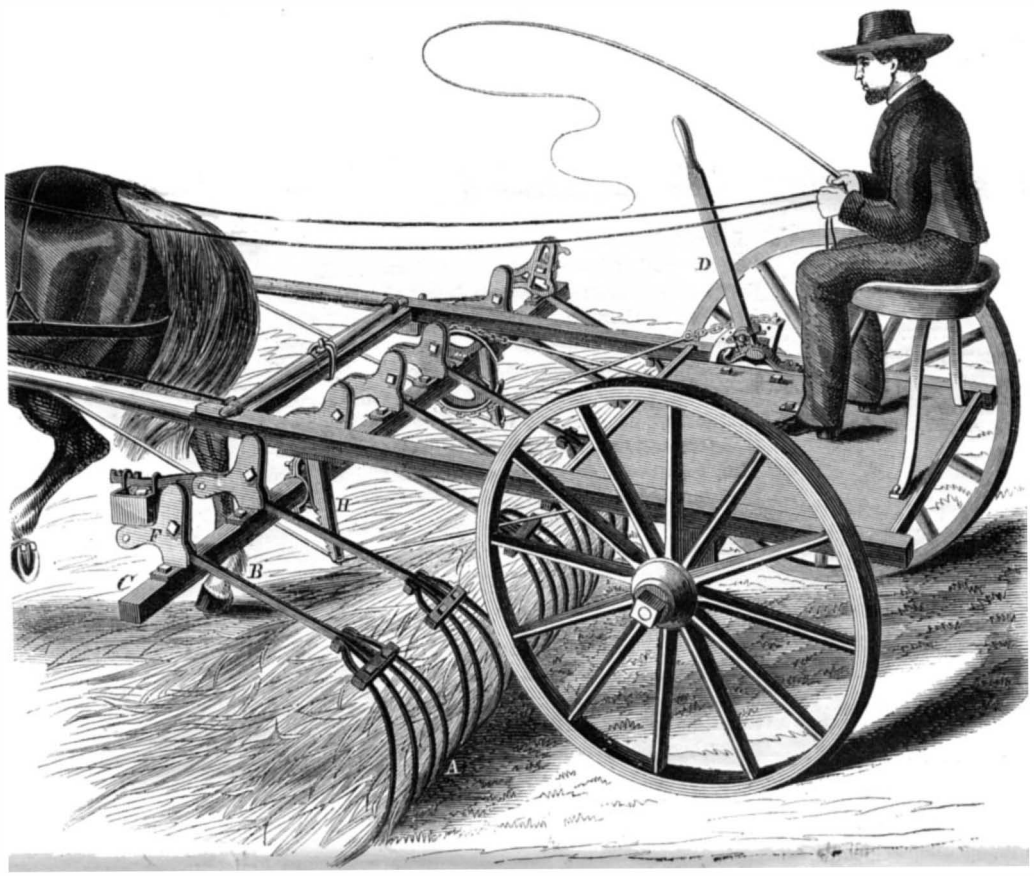
Improved Horse Hay-Rake.

Farmers are beginning to discover that a good horse rake is indispensable to them, and many are now in use where before they were strenuously opposed. During a recent trip over a portion of the New England States we noticed numbers of mowers, reapers, cultivators, etc., where but a few years since such machines were unused, the farmers saying they might do for the west, but conld never be used to advantage among the rocks and hills of New England.

The rake herewith illustrated is well arranged, easily operated, and strongly made. In its general plan and principle it will, no doubt, be popular with farmers. The rakes, A, are independent of each other, and the handles, B, are all connected to the cross bar, C, so that by shifting the lever, D, they can be raised or lowered in order to discharge the load. The ends of the rake arms are fastened to the bell cranks, F, and the rake arms rise and fall in the slot between the cranks. This is a valuable feature, as it permits any one of the rakes to rise, if obstructions lie in the path,and clear them without breaking the teeth. In going over rolling ground the teeth by their elasticity spring clear of hillocks or other obstructions, and for the same reason the rakes accommodate themselves to the uneven surface. The driver controls the rake from the platform, and beneath this platform there are two screw clamps formed of flat iron bars, having two bolts in each. One of these bars has a lug on it by which it is bolted to the platform. The object of this clamp is to use different sets of wheels, of greater or less diameter, as may be convenient or desirable, and the rake machinery may be purchased independently of the wheels, so that by this additional feature any set of wheels can be quickly put on the machine. The bar, C, which carries the rakes, is also furnished with a sliding rack, H, through which it can be raised or lowered to accommodate the change in the axle. The bar, C, also turns slightly in the bearings, so as to perform its work properly. One man and one horse can easily manage this hay rake.



HUSSEY'S HORSE HAY-RAKE.

A patent was procured on this rake through the Scientific American Patent Agency, by David G. Hussey, of Nantucket, Mass., on Oct. 18th, 1864. For further information address the inventor as above.

THE American File Works, in Pawtucket, have more orders for their machine cut files than they can supply. English steel is mostly used by this company.

Improved Railway Chair.

There have been several serious railway accidents of late caused by misplaced or defective rails. The importance of securing the permanent way, so that it shall be such in reality, is apparent to every thinker. The chair herewith illustrated is strong and easily attached in place. Fig. 1 shows a perspective view, and Fig. 2 a section which will be easily understood. The inventor says:—

"The object of my invention has been to construct a two-part rail chair, having cheeks for supporting the rail head on each side, so that the joint and cap of the rails will at all times remain even and in line. A bolt passing through the end of the rail, from one part of the chair to the other, to secure the cheeks of chair against the side of rail serves also as an additional security against the loosening of the rail. This arrangement for fastening a joint is strong, permanent and cheap, and does not interfere at all with the longitudinal expansion or contraction." The chairs can be made of wrought iron as readily as any chair now in use, but the inventor proposes to cast them and afterword anneal them, which can be done at a small cost. The base of one part of this chair will interlock and break joint with the other part; thus affording a strong and substantial support for the rail at the joint. They can be readily applied to or removed from the rail in case they break, or are adopted on track already down, without moving the sections thereof out of line, or loosening other parts of a rail section for that purpose."

This rail is the invention of Amos Rank, and was patented on 27th Sept., 1864. For further information address the inventor at Salem, Ohio, or Messrs Snyder & Walter, Broadway, N. Y.

Fig. 1

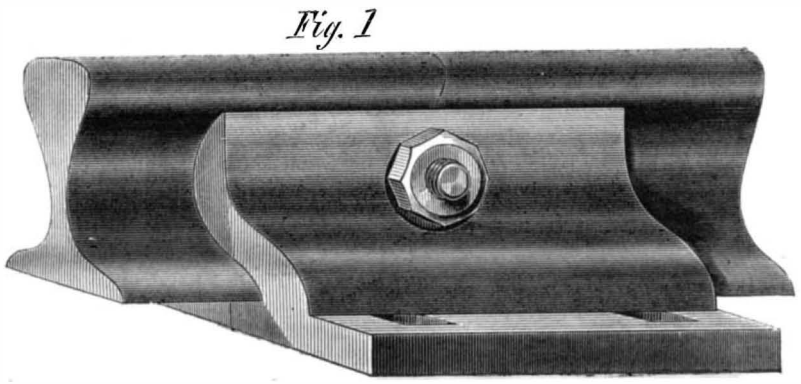
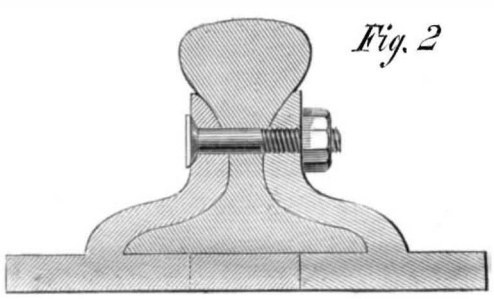


Fig. 2



RANK'S RAILWAY CHAIR.

Overwork.

Unwise above many is the man who considers every hour lost which is not spent in reading, writing or in study, and not more rational is she who thinks every moment of her time lost which does not find her sewing. We once heard a great man advise that a book of some kind be carried in the pocket, to be used in case of an unoccupied moment, such was his practice. He died early and fatuitous. There are women who, after a hard day's work, will sit and sew by candle or gas light until their eyes are almost blinded, or until certain pains about the shoulders come on, which are almost insupportable, and are only driven to bed by physical incapacity to work any longer. The sleep of the overworked, like that of those who do not work at all, is unsatisfying and unrefreshing, and both alike wake up in weariness, sadness and languor, with an inevitable result, both dying prematurely. Let no one work in pain or weariness. When a man is tired he ought to lie down until he is fully rested, when, with renovated strength, the work will be better done, done the sooner, and done with a self-sustained alacrity. The time taken from seven or eight hours' sleep out of each twenty-four, is time not gained, but time much more than lost; we can cheat ourselves but we cannot cheat nature. A certain amount of food is necessary to a healthy body, and if less than that amount be furnished, decay commences the very hour. It is the same with sleep, and any one who persists in allowing himself less than nature requires, will only hasten his arrival at the mad-house or the grave. This is especially true of brain work.

CADET ENGINEERS IN THE NAVY.—The Navy Department has issued regulations under which cadet engineers for the navy may be appointed. The number of the cadets is limited by law to fifty. Each application must be made to the Secretary of the Navy. The candidate must be under eighteen years of age, furnish evidence that he possesses a good character and mechanical aptitude, and that he has been employed two years in the fabrication of steam machinery. Before appointment he must be examined as to mental qualifications and physical fitness. The course of study will comprise two academic years.

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VOL. XI. NO. 19....[NEW SERIES.]....*Twentieth Year.*

NEW YORK, SATURDAY, NOVEMBER 5, 1864.

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FRUITLESS INVENTION.

If a man walking in the fields picks up a diamond and goes straightway and locks it up in his strong box it is commercially no better than a pebble, and might be one for all the benefit it confers upon its possessor. So with the inventor, who, after years of toil, suffers his inspiration to come to naught for want of energy in putting it before the public; his time is lost, his ingenuity has borne no fruit, and neither he nor the world is a whit the better for the discovery.

There are at this time, as there is at all times, countless instances where ingenious persons have machines locked up in closets which might as well have never been constructed if they are suffered to remain idle. If the wheels never move to some purpose, if the iron sinews and steel arms never save human muscle, and lighten the curse pronounced upon the race, the metals should be melted up again to serve some good end if possible.

A good invention unapplied—not a perpetual motion—is capital locked up, and it is the supremest folly for a man to spend his time in originating some improvement in the arts and straightway conceal it, so that no one receives any advantage therefrom. Such a case occurs to us at this writing. The inventor of a novel machine for a novel purpose, recently described in this journal, keeps said machine up in the garret of a house carefully enveloped in as many wrappings as Gliddon's mummy. Once in a while he explains it to some confidant, gloats over the fortune it would bring him if it were applied in practice, but takes no step toward securing that fortune beyond the possibility of losing it. In the meanwhile there is, doubtless, some other more enterprising inventor making long strides to circumvent our slow friend. Fortunes do not go begging now-a-days. Given—a mechanical problem and a certain reward for its solution, a hundred ingenious individuals stand ready to seize the prize.

If an invention is good for nothing but to lock up why ever make it? Experiments are good and necessary to the perfection of every invention, but there is an end to experiment and a time to strike out boldly into actual operations. "Once begun the battle is half done," says the proverb, and our old copy-books say "Procrastination is the thief of time;" let the wise reader who has an invention of merit see to it that he is not robbed of his time and money by his own foolish procrastination.

EXPLOSIONS—OUR CITIES IN DANGER.

In his last report the Secretary of War recommended to Congress the removal of all powder magazines from the vicinity of our large cities, but in the multitude of important matters demanding the attention of Congress the subject failed to secure attention. If one of our cities should be smashed into rubbish the members of Congress would doubtless proceed, with feelings of mingled awe and remorse, to comply with the Secretary's recommendation. We, however, ought not to need any further warnings to rouse our legislators to the importance of this measure. The recent explosion at Erith, in the vicinity of London, occurred not in a powder mill, but in a warehouse where powder was merely stored, and so thorough were the precautions adopted that the *Mechanics' Magazine* is led to an improbable theory of spontaneous combustion to account for the ignition. That explosion was the greatest that ever occurred in England, and one of the English papers says, that the buildings which recently covered some acres at Erith are heaps of tumbled earth and bricks and massive fragments of timber.

We have no doubt that in handling the powder in our magazines the most approved regulations are adopted and rigidly enforced by our intelligent army officers, but there is one danger against which it is probably impossible effectually to provide—that is lightning. It will be remembered that during the past summer a serious explosion of ammunition occurred from this cause in General Sherman's army in Georgia. From lightning also resulted the greatest and most disastrous explosion of gunpowder that ever took place in the world. In August 1767, a flash of lightning struck the church of St. Nazaire, in Brescia, Italy, setting fire to 100 tuns of gunpowder, which was stored in the vaults. The explosion destroyed one-sixth part of the city, and killed about 3,000 of the inhabitants.

No rules however rigid, and no precautions however complete can render safe the location of large magazines of gunpowder in the vicinity of cities. We hope that among the earliest acts of the next Congress will be the removal of these magazines to isolated positions where their explosion would not result in any considerable destruction of life and property.

BIRDS IN CENTRAL PARK.

We invite the attention of the Central Park authorities to the remarks of Dr. Trimble at the Farmers' Club, reported on another page. It seems that there is one effectual protection, and one only, against the ravages of that minute but most destructive class of animals, the insects that devour our fruits and crops. This protection is found in the insatiable hunger of insectiverous birds. To sweep away the measure worms, canker worms, and all others of this class of pests we have only to fill our trees and shrubs with flocks of singers and warblers.

The way to fill the trees of the Central Park, or the trees of any grounds with birds, we can point out from our own experience. It is only necessary to plant a few cherry trees. The reed bird and the robbin, especially, will flock into these trees in multitudes. As both the cherries and the birds would be protected in the Park, the success of the experiment would be assured. The one charm that is yet wanting to that beautiful pleasure ground is the air made vocal with the joyous songs of birds.

GALVANIZING IRON—A PRIZE TO THE INVENTOR.

In a report in *L'Invention* of the proceedings of the Societe d'Encouragement Pour l'Industrie Nationale, we find a report by M. Barral, in the name of the Committee of the Chemical Arts, on the prize founded by M. le marquis D'Argenteuil, in favor of the author of the discovery the most important for French national industry.

M. Barral says that the chemist Malouin in the middle of the last century proposed to substitute zinc for tin in protecting iron from rust, but when the manufacturers pointed out to him that some parts of the surface would escape being covered, and would consequently rust, he had nothing to reply to them. His discovery remained therefore a whole century unfruitful. But M. Sorel, enlightened by the great discovery of Volta that zinc places iron in conditions entirely different from its ordinary conditions, rendering it non oxidisable in the air, perceived that if the iron was in contact with zinc at a portion only of its surface, it would be protected from rust throughout its whole mass.

M. Barral also says that the process of galvanizing iron has been materially improved within the last six years, especially in regulating the thickness of the coating to just the quantity necessary, which has greatly economised the process.

The prize bestowed on M. Sorel is the fourth of these prizes that have been decreed. The others were to the learned engineer Vicat, the illustrious chemist Chevreul, and the celebrated mechanician Heilmann.

DEFINITIONS OF GEARS.

Cog wheels, as they are familiarly called, are of different classes and titles. The several varieties are here explained:—

A spur wheel has its teeth placed straight across the face of the wheel in line with the shaft, like the prongs of a spur.

A beveled wheel has the face inclined on one side at an angle of 45° with the shaft.

A worm wheel has its face hollowed to receive a screw, and the teeth are inclined to suit the spiral of the screw thread.

A ratchet wheel has its teeth all leading one way, like a circular saw.

Spiral wheels have teeth inclined at various angles with the side of the rim. Sometimes the teeth form a V across the face, or they may be of any shape to suit the whim of the designer.

Staggered gears, as they are sometimes called, have square teeth set diagonally across the face; the second row of teeth are not placed in line with the first but "staggered" or set opposite the space in the first row. These are often used for planing machines, or where motion in one direction is to be suddenly changed to an opposite direction. They are supposed to prevent lost motion, but are not efficient for this purpose except when new.

Backlash of gears is the rattling noise caused by one wheel moving at a greater velocity than the other, and being suddenly overtaken by it. The face of one tooth therefore strikes against the back of the other. Gears set too deep, or so that the teeth bottom will also make a heavy rumbling sound. Staggered gears do not prevent backlash except when new. The tooth, or teeth that take the heaviest strain, or backlash, will soon wear so as to lose it, and in time the system will accommodate itself to the work, so that no benefit will be realized from them or it.

Spur gears for communicating direct motion, are as good as any toothed wheel. They are cheap to make, run well when properly made, and with but little jar. It is a great fault to make small gears with large pitches. It is akin to making small bolts with coarse threads. The coarse teeth have to be deeper, so that they are sooner broken and make more noise. Respecting the form of the teeth there is much diversity of opinion. It seems to be a favorite plan for general work to make them of the same shape that they naturally wear to, but very many mechanics make the teeth the frustrum of a cone, or a regular taper from bottom to top. Gears with wooden teeth driven by wheels wholly of iron are coming more into use for large, heavy sizes. The best wooden wheels have the teeth made of young hickory, or lignum-vitæ boiled in linseed oil, and set with the grain end on, in the direction of motion. The body of the wheel is iron, and recesses are cast in the face, in which the wooden teeth are set and fastened by wooden keys. When well made they run a long time. Tallow and blacklead are employed to lubricate them. Beveled wheels are also thus made.

A sprocket wheel, as the English artisans call it, is our rag wheel. The wheels on chain pumps are sprocket wheels, and are used to carry machinery driven by chains. The teeth are placed a certain distance apart, so that the wheels are sometimes eight sided, or six sided, the chain links are of course a certain length; this is called by some a clip wheel.

It is not necessary that gear wheels should be perfectly round; they work well when made elliptic or oval. Of course two wheels running together must

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be both of the same class, round or oval. When oval the longest diameter of one wheel gears into the shortest diameter of the other. Sometimes staggered gears are made by taking several spur wheels and keying them on the shaft so that the tooth of one comes opposite the space of the other.

MAN TRAPS AND SPRING GUNS.

It used to be common in England, in former times, to warn depredators off premises by putting up signs reading "man traps and spring guns," thereby hinting at a speedy and terrible fate to the evil-disposed. This practice was at any rate honest; but what shall be said of these persons in modern times who delib erately place man traps where the innocent and unthinking walk headlong into them?

The record of accidents from machinery is daily increasing. In looking over our exchanges it is painful to notice that the majority of the victims are women. Entangled by their skirts they are drawn around shafting and killed instantly. As many as twenty persons have been so killed within the past few weeks. Some of them were young women who ought to have been more careful, but this is no excuse for those who left the snare open. The accidents above alluded to were nearly all caused by shafting. One of them in particular was in a printing-office, where a shaft ran only a few inches from the floor; over this shaft women stepped continually in doing their work, until in an unlucky moment one of the females was caught by her skirts and dashed to pieces.

In these days of the universal adoption of machinery, shafting, pulleys, gearing, and belts are continually running in dangerous places. Children play about them; men and women pass and repass them daily; when suddenly one is taken and the rest left, but the cause of the tragedy is untouched. Men *will* blow their brains out with guns and pistols by carelessness, there seems to be no help for this, but people may and should be prevented from walking blindly into gears, or being carried around shafts. In a saleratus factory of this city a woman there employed went into the basement a few weeks ago for some purpose, and, being ignorant of the locality, walked straight into a set of heavy gears, running at great speed, and was swallowed up in an instant. After this "accident" it is reasonable to infer that the gearing was boxed up, but what utter recklessness on the part of those who left the wheels in such a condition? Is there not one life charged against them?

When belts run through floors they should be boxed up certainly waist high; a six-inch belt, running fast, will take a man's leg off as quick as a saw; and pulleys that buzz round within an inch of one's nose should also be boxed, or the thoroughfare made in some other direction. Gears must be cased with sheet-iron on the "running side"; wooden boxing shatters, and is liable to get caught and carried in. A man may put his head in the other side of the wheels with impunity. There are many belts now, many shafts at this moment in a condition to catch the first unwary passer by the heels and lay him low. Why not secure them, why not place them beyond the power for mischief? They should be boxed immediately.

THE GREAT MECHANICAL PROBLEMS OF THE DAY.

Is the revolving turret or the broadside the best system of making iron-clad ships? Is there practical economy in working steam expansively? Is cast iron, wrought iron, or steel the best material for heavy ordnance? Should large cannon be rifled for elongated shot, or made with smooth bores for balls? Will the pneumatic tube prove a practical system for the general conveyance of passengers? Will steam plowing come into general use?

In the world of mechanical science these are the most prominent problems at the present time, and a vast amount of thought, labor and money is being expended in their solution.

In all inquiries it is well to pause occasionally, and take a comprehensive view of the existing condition of the question, to see what principles bear upon it, what facts have been established, and what yet remain to be deter ined. Such a view we purpose briefly to take of each of the great mechanical problems of the day, beginning in this number with the question of revolving turrets.

REVOLVING TURRETS OR BROADSIDE SHIPS?

For protecting the face of land forts there is no limit to the thickness of iron that may be employed; if 8 inches is not sufficient to resist the force of any shot, 12 inches may be used, and if 12 inches is not enough there is no objection to the employment of 24. But for a ship that is to float upon the water, the great weight of armor plates imposes a limit to their thickness. If an old-fashioned three-decker were to be plated it would be necessary to make the metal so thin that it would be of no service whatever; but as the depth of the sides is reduced, of course the thickness of the plates may be increased. Consequently broadside armor-plated ships are made with only one gun deck, and even then it is impossible to make the armor plates more than 5 or 6 inches in thickness. A few years ago it was supposed that solid iron plates 4½ inches in thickness were practically proof against any cannon shot, but it is found that cylindrical steel bolts, and even shells, may be driven through 5-inch plates, and now the thickness is increased to 6 inches.

To reduce the depth of the sides to a minimum, Capt. Ericsson conceived the idea of cutting the vessel almost down to the water's edge, and then raising the guns to a sufficient hight to work by placing them in one or more revolving turrets on deck. As the area of the turrets' sides is inconsiderable when compared with that of the whole vessel, the walls of these turrets might be made of any thickness desired, and those on the *Puritan* and *Dictator* are 15 inches thick; though the old monitor turrets, with only 8-inch walls have never been penetrated by any kind of shot.

The prominent objections to turret vessels are the small number of guns which they can carry, and the uncomfortable quarters of the crew below the water line. The answer to the first objection is that one large gun is far more efficient than a whole broadside of little ones, and the soundness of this answer has been very fully confirmed in practice. The closeness of the quarters is remedied by artificial ventillation by means of fans. It is also objected that turret vessels will be poor seaboats, but the English turret ship, the *Royal Sovereign*, on her recent trial trip, behaved better in a rough sea than any of the broadside iron-clads. This question in regard to our own sea-going monitors will probably be settled by the first trip of the *Dictator* before these lines meet the eyes of our readers.

This is a general view of the present aspect of the great question of broadsides or turret ships. For our own part, while we do not regard the question as absolutely settled, we are now inclined to the opinion that the *Dictator* and the *Puritan* are the most powerful ships of war that have ever yet been launched upon the waters of this globe.

TRIAL OF THE 1,000-POUND CANNON.

Since our last mention of the 20-inch gun the carriage has been completed and the gun mounted, and on Wednesday, the 25th of October, this cannon was loaded and fired with the largest charge of powder and the heaviest shot that has ever yet been discharged from any piece of ordnance. The Armstrong gun has been fired with 90 pounds of powder, and a missile variously stated at from 330 to 600 pounds. The 20-inch gun was fired on the 25th ult. with 100 pounds of powder and a solid ball of cast-iron weighing 1,080 pounds.

The gun was first fired with a blank cartridge of 100 pounds. It was then loaded with 50 pounds of powder and a solid shot and fired point blank. The shot struck the water throwing up showers of spray as large as a ship.

For the last trial a charge of 100 pounds of powder was placed below a solid shot of 1,080 pounds, and the gun was elevated at an angle of 25 degrees. At the report the ponderous globe rushed up through the air with a hoarse roar, and sweeping its long ellipse fell a great distance—estimation 3½ miles—away into the sea.

The report of the gun was not perceptibly louder than that of moderately large ordnance, and the concussion produced no extraordinary trembling of the earth. There is no doubt, however, that the half tun of cast-iron which this gun hurls forth would have more effect in crushing in the sides or deck of an iron-clad ship than other missile that has ever been wielded by human skill.

We are in possession of facts, and shall soon give to the public full particulars of the trial of a wrought-iron gun of smaller caliber, for which we recently solicited a patent for a well-known engineer in this city. The result will probably far surpass those of any other gun yet brought before the public.

THE MARKET FOR THE MONTH.

The prominent features in the trade of the country during the past month are a considerable suspension of cotton manufacture in consequence of the great fluctuation in prices, and a panic in the city of Chicago. Unlike most other cities in the country, Chicago has gone right forward in building during the war, and it is not strange that there should be some unsafe extension of credits among a portion of her citizens. The small effects, however, resulting from the panic there show a stability in the condition of the traders which never existed before the war in any of the towns east of the Rocky Mountains.

By the fall in cotton from $1 80 to $1 60, many of our large cotton manufacturing establishments lost so heavily that they have determined to suspend operations till our currency is in a more stable condition. One of the worst evils of a largely inflated currency is its liability to these great and sudden fluctuations which render all business calculations uncertain, and thus exert a paralyzing influence on the industry of the community.

The trade of the country still continues on the cash system. Hardly any merchendise, even dry goods, is sold on a credit of over 30 days. The mercantile community of this country was never so free from the possibility of extensive bankruptcies as at the present time. There is a good deal of talk about a crash when the war is over, but men cannot "fail" to pay debts that they do not owe.

The limited supply of cotton has of course diminished the trade in fabrics made of this staple, but the trade still continues enormous even in calicoes of American manufacture. We are told by one of our domestic commission houses, that a few days since a leading jobber stepped into their store and bought a bill of ninety thousand dollars in the single article of American prints.

The following list shows the change during the month in the prices of the leading staples:—

	Price Sept. 27.	Price Oct. 26.
Coal (Anth.) ₩ 2,000 lb	$10 00	9 50@11 00
Coffee (Java) ₩ lb	45	45
Copper (Am. Ingot) ₩ lb	47	47@48
Cotton (middling) ₩ lb	1 20	1 22
Flour (State) ₩ bbl	8 30	890@925
Wheat ₩ bush	$1 80@ 2 50	$2 25@2 60
Hay ₩ 100 lb	1 30	1 30@1 35
Hemp (Am.drs'd) ₩ tun.	320 00 @360 00	$320 00@350 00
Hides (city slaughter) ₩ lb.	11½@ 12	10½@ 11
India rubber ₩ lb	1 20	1 10 @ 1 15
Lead (Am.) ₩ 100 lb	$14 00 @ 14 50	$13 87 @14 00
Nails ₩ 100 lb	$9 50 @ 10 00	9 50 @10 00
Petroleum (crude) ₩ gal	39	46½@ 47
Beef (mess) ₩ lb	$10 00 @ 13 00	8 00 @13 00
Saltpeter ₩ lb	24 @ 30	24 @ 30
Steel (Am. cast) ₩ lb	20 @ 24	18 @ 33
Sugar (brown) ₩ lb	15 @ 23	18 @ 21
Wool (American Saxony fleece) ₩ lb	95 @ 1 05	90 @ 1 00
Zinc ₩ lb	20	20@21
Gold	2 00	2 16

Binding the "Scientific American."

It is important that all works of reference should be well bound. The SCIENTIFIC AMERICAN being the only publication in the country which records the doings of the United States Patent Office, it is preserved by a large class of its patrons, lawyers and others, for reference. Some complaints have been made that our past mode of binding in cloth is not serviceable, and a wish has been expressed that we would adopt the style of binding used on the old series, *i. e.*, heavy board sides covered with marble paper, and morocco backs and corners.

Believing that the latter style of binding will better please a large portion of our readers, we commenced on the expiration of Volume VII., to bind the sheets sent to us for the purpose in heavy board sides, covered with marble paper and leather backs and corners.

The price of binding in the above style is 75 cents. We shall be unable hereafter to furnish covers to the trade, but will be happy to receive orders for binding at the publication office, No. 37 Park Row, New York

VOLUMES III., IV., VII., AND X., (NEW SERIES) complete (bound) may be had at this office and from periodica dealers. Price, bound, $2 25 per volume, by mail, $3—which includes postage. Every mechanic, inventor or artisan in the United States should have a complete set of this publication for reference Subscribers should not fail to preserve their numbers for binding VOLS. I., II., V., VI. and VIII. are out of print and cannot be supplied.

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RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week ; the claims may be found in the official list:—

Foot Bellows.—This invention relates to a new and improved foot bellows for blowing and kindling fires, operating blow-pipes, etc. The invention consists in the employment or use of two bellows and a wind-chamber arranged in such a manner that the operator, by standing on the device, may, in connection with his weight, operate it with but a moderate effort and eject a continuous blast from the nozzle. Henry Neumeyer, Macungie, Lehigh county, Pa., is the inventor.

Press.—This invention consists in the employment or use of one or more worms secured to a longitudinally adjustable horizontal shaft and gearing in a corresponding number of worm wheels secured to vertical arbors, each of which carries a worm gearing in a toothed rack which rises from the follower of the press, and also a bevel pinion gearing in a wheel mounted on a horizontal longitudinally adjustable shaft, in such a manner that either of the two horizontal shafts can be thrown in gear with the rack or racks rising from the follower, and the motion of the follower and the power acting on the same can be graduated to be quick and less powerful at the beginning of the operation and slow and very powerful towards the end of the operation, or after the material has been compressed to a certain degree by the quick motion. Joseph P. White, 418 Greenwich street, New York City, is the inventor, and he has assigned one-half of his right to Thomas Gannon, 25 Old Slip, New York.

Machine for finishing Nuts.—The object of this invention is to finish nuts as the same are received from the blacksmith, from the nut-machine, or from the foundry, by reaming out the holes to the proper size, forcing the nuts through dies so that the sides of the same are rendered flat and bright, smoothing off the upper and lower surfaces, and finally tapping the nuts, which are shifted from one reamer or punch to the other by the automatic action of the machine in such a manner that the operator or attendant has nothing else to do but to feed in the rough and unfinished nuts, which, when finished by the machine, are deposited in a suitable receptacle ready for immediate use. Frank P. Pfleghar and Wm. Schollhorn, New Haven, Conn., are the inventors.

Water Closet Cock.—This invention relates first, to an improved arrangement of parts whereby the construction of compression valves and faucets is simplified, and an article produced not so liable to derangement or injury from wear; second, to an improved arrangement of a solid-headed valve and a solid-headed actuating rod, presenting no external joint or connection that could be tampered with, nor any internal joint that can become deranged and cause the valve to leak; third, to an improved method of packing a valve rod, whereby a simple, cheap, and effective substitute for a stuffing-box is obtained; and fourth, to the arrangement of a grate or strainer operating in connection with the supply chamber and valve in such manner that chips and foreign substances are effectually excluded from passing through or obstructing the operation of the valve. John Broughton, 41 Centre street, New York, is the inventor.

Paraffine in the Oil Wells.

Paraffine was discovered about 1830, and by two separate chemists at the same time. Christison, of Edinburgh, found it in Rangoon petroleum. In appearance and in substance it resembles the spermaceti of the whale, and the white wax of the bee or certain plants. It is called paraffine from *parum affinis*, having so little affinity for other bodies. This substance stops up many of the veins of oil in the wells at Oil Creek, for it is a substance held usually in solution and in large quantities in the petroleum, the hydro-carbon oils being its natural solvents. When oil stands, and especially in cool weather, it remains with the heavier oil at the bottom.

In this way some of the most valuable and productive wells have been for a time choked up. Neither acids nor alkalis have effect upon it. Heat melts it at a temperature of 112 degrees, and cold solidifies it. As the heat of the earth is supposed to increase as we descend, the temperature of the oil is favorably affected by this circumstance, and the deeper the well the better for holding the paraffine in solution. But it is not until we get the thermometer up to 112 degrees that paraffine always melts, and thus it occurs that portions of it form on the inside of the tubes and those veins in the sand rock through which it passes. Another circumstance considerably adds to this tendency. We all know that as the condensation of gases increases their temperature, so their expansion diminishes it, and whenever there is a large and sudden escape of those hydro-carbon gases, which are among the best indications of oil there, there is a lowering of the thermometer proportionably great. Hence, in all flowing wells, in proportion to their energy and the escape of gas, the oil when it reaches the surface is intensely cold, often it is almost freezing, owing entirely to the liberation and expansion of these gases. The effect of this must be an increased tendency to make deposits of this paraffine along the passages through which the oil passes, and there are many instances in which they become so obstructed that the oil ceases to flow. Many suppose in these cases that the oil is exhausted, when the real cause may be in any of these instances simply an obstruction in the passages. In such case a new well used to be considered the only remedy, but now various other methods are resorted to. Often new tubing in the well is sufficient to set matters straight, but where that fails by connecting the mouth of the tubing with the boiler of the engine, steam is forced down and partly by the pressure and probably still more by the heat, the paraffine is melted like wax by a temperature over 112 degrees.

Not long since a well that had flowed at the rate of a hundred barrels a day, and had finally given out, was by this process so far restored as suddenly to flow sixty barrels, bringing up with the oil through the tubing, immense quantities of paraffine and obstructing materials that had been loosened from their hold below in the undergrouud chambers by the vapor bath. In other cases air forced down by an air-pump, has, by the mechanical pressure, effected much the same sort of relief. Steam cools and condenses to some extent before it reaches the point of action. But condensed air does not. Which on the whole will prove most efficient, time and experience must decide.

Every month new methods are being adopted, and some fresh knowledge is gained, and what will be ultimately reached in the way of injections it is hard to say. But as by the stomach pump we are able not only to draw off the contents of the stomach, but to inject medicines and wash out that great and vital organ, so shall we become increasingly able, as it were, to wash out the bowels of the earth, cleanse the cavities of these oil wells, and by enabling them to cast off their contents, restore their full tone and action to them. Perhaps we shall learn before long that full half the value of nearly every man's farm lies below the surface in the shape of mines, springs of fresh water or salt, oil or mineral manures; and the days will come when artesian wells will be bored, and the strata duly registered, to enhance the value of almost every lot.—*Philadelphia Ledger.*

FRENCH COMPOSITION FOR REMOVING INCRUSTATIONS.—M. Dulrue, of France, has brought forward some compositions for preventing and removing incrustations. These compositions consist entirely of vegetable matters, and are prepared by dissolving or infusing in hot water the bark of the oak and pine, as well as the leaves of the sumach tree ground and reduced to the state of a coarse powder. This infusion is concentrated to a density of about ten degrees Beaume, and to it is added a quantity, say from fifteen to thirty per cent, of cream of tartar and spirits of turpentine. In employing this liquid to prevent incrustation in steam boilers, a quantity of it is introduced from time to time, the quantity required varying according to the capacity of the boiler. Three pints of the liquid are generally sufficient for every thousand pints of water in the boiler for each ten days.

MR. T. BONAR, 124 Nassau street, has sent us a lithograph of the Japanese corvette *Fusiyama*, which is very spiritedly executed.

ISSUED FROM THE UNITED STATES PATENT-OFFICE

FOR THE WEEK ENDING OCTOBER 25, 1864.

Reported Officially for the Scientific American.

☞ Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

44,776.—Machine for Cleaning Peat.—Edward H. Ascroft, Lynn, Mass.:

I claim the arrangement or combination of rotary perforated drums or cylinders, to operate together as separators, substantially as set forth.

I also claim combining with the separating cylinders the clearers, f, operating in the manner substantially as set forth.

44,777.—Balance Steam Valves.—R. P. Baillie, Detroit, Mich.:

I claim the arrangement of the two seats, B B, on the opposite sides of the valve chest, A, to operate in connection with the double valve, C, in the manner and for the purpose substantially as herein shown and described.

[This invention consists in a steam cheat being provided with two seats on its sides, one opposite the other, and arranged in combination with a double, D, valve in such a manner that each valve works on one of the seats, and the two valves combined are perfectly balanced and allowed to act just as easy under a pressure of a hundred or more pounds as they do in the open atmosphere.]

44,778.—Diagram for Teaching Penmanship.—Isaac Bat s, Poughkeepsie, N. Y.

I claim the employment or use in teaching penmanship of a diagram representing the correct position of the arm, hand and pen, substantially such as herein shown and described, and for the purpose set forth.

[This invention consists in the employment or use in teaching penmanship of a diagram representing the correct position of the arm, hand and pen in such a manner that the student is enabled, by placing the diagram on the table and his arm over it, to find at once and without further instruction the most approved position for writing.]

44,779.—Clothes Wringer.—Eben Blakeman and Joseph R. Gill, Charleston, Ill.

We claim, first, Holding the main parts of the frame of the wringer together by means of the rods, a, which sustain the springs, e, and the rods, d, and the grooves in the roller shafts substantially as described.

Second, The combination of the friction wheel, D', its hanging journal box, g, and top piece, G, with the friction wheels, D and D'', and the pressure roller, C, substantially as described.

Third, The gear, k, and shaft, S, in connection with the lower friction wheel, D, as set forth.

[The general object of this improvement is to produce a wringer which shall be more convenient for use than those now made, as well as cheaper in its construction, less liable to give way under the strain to which such articles are usually subjected, and which shall be self-adjusting while in operation.]

44,780.—Scythe Fastenings.—Alexander Boyden, East Foxboro', Mass.

I claim the combination of the movable bearer or wedged plate, G, or its equivalent with the snath-holder, A, and the confining clamp, B, thereof.

I also claim the combination of the adjuste , D, with the ribs, e e, or their mechanical equivalents with the snath-holder, A, and its clamp, B, provided with screws and nuts, and applied to such holder substantially as specified, the said holder, A, having a slot, l', made in it in manner and for the purpose hereinbefore specified.

44,781.—Metal Shirt Bosoms.—O. G. Brady, New York, N. Y.

I claim a shirt bosom of metal constructed substantially as above described.

[An illustration and description of this, invention will shortly appear in the SCIENTIFIC AMERICAN.]

44,782.—Apparatus for Raising Water, &c.—Abel Brear, Saugatuck, Conn.:

I claim the arrangement of the inlet and outlet openings of the chamber, A, and the mouth of the elbow-shaped nozzle, D, all in line with each other and in upright positions, substantially as herein specified.

44,783.—Water-Closet Cocks.—John Broughton, New York, N. Y.:

I claim, first, The arrangement of the solid valve, e, and solid headed valve-rod, g, connected together substantially as shown, and supported by and working in the tubular bearing of the nipple or neck, n, in combination with the supply and discharge chambers and the elastic valve-seat, K, all constructed and operating substantially as described.

Second, Forming an annular groove upon that part of the valve-rod, g, which slides within the neck of the chamber, B, and filling the same with cork or other elastic material, substantially as and for the purpose above described, and thus dispensing with a cover on the end of the neck.

Third, The arrangement of a grate or strainer upon the valve stem below the valve, and moving within the supply chamber above the induction pipe, substantially as described.

44,784.—Combined Gun and Pistol Bayonet.—Robt. K. Colvin, Lancaster, Pa.:

First, I claim the arrangement and combination of two triggers to operate a gun, and a revolving pistol, separately or together, as herein described.

Second, I also claim the arrangement and combination of the gun, pistol and bayonet, when arranged and combined as herein described,

44,785.—Plaster and Seed-Sower Combined.—George S. Conklin, Goshen, N. Y.

First, I claim the combination of the rotary shaft, H h, sieve, G, and rectangular and triangular apertures, e f, the whole being employed to agitate the seed and plaster, crush the latter, and separate straw and trash, in the manner and for the purpose set forth.

Second, I claim the shaft, J j, in combination with the triangular apertures, d' l, substantially as and for the purpose specified.

[The object of this invention is to provide more effectual means for depositing mixed plaster and seed, and the invention consists chiefly in the use of a shaft having projections to crush the plaste

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into small particles, and an additional rotating shaft carrying agitating brushes to insure the unretarded flow of the plaster and seed.]

44,786.—Harness Buckle.—L. D. Cowles, Armada, Mich.

I claim the frame, A, in connection with the stirrup, C, and the lever frame, B, provided with the eccentrics, c c, all arranged to operate in the manner substantially as and for the purpose herein set forth.

[This invention consists in using in connection with the frame or body of the buckle a stirrup and cam-lever frame, arranged in such a manner that the strap may be very readily taken up and let out, and a buckle obtained without any drilling or riveting whatever,]

44,787.—Buckles for Harnesses, &c.—L. D. Cowles, Armada, Mich.:

I claim the stirrup, C, and lever frame, D, provided with the cams, E E, in combination with the frame or body, A, provided with the lips, B, having flanges, a, at their outer ends, all being arranged substantially as and for the purpose set forth.

[This invention consists in the employment or use of a stirrup and a lever frame provided with eccentrics, and attached to the frame or body of the buckle, all being arranged in such a manner that the leather or strap may be firmly secured, and also readily taken up or let out as occasion may require, no holes being required to be made in the leather or strap, as is the case with the ordinary tongue buckle, and which greatly weakens the strap.]

44,788.—Horse Hay-Forks.—John Crandell, Ilion, N. Y.

I claim a horse hay-fork constructed of the tines, A A′ A′, secured together at the proper distance apart by means of the collars, F, bar, E, and set screws, c, with two of the tines, A′ A′, formed with bars, B, at the rear, bent or curved upward, and connected to a head, C, substantially as set forth.

[This invention relates to a new and improved horse hay-fork for elevating hay in barns and depositing it in mows. The object of the invention is to obtain a simple device for the purpose specified, one which may be cheaply constructed, be strong and durable, and operated or manipulated with the greatest facility.]

44,789.—Water Elevators.—Jonathan Dearborn, Seabrook, N. H.

I claim the improved chain and its sprocket wheel as constructed in manner and to operate as specified, the chain under such construction having an arch or curved brace to each link as explained, and the wheel being made with recesses or spaces between its chain link bearings, and for the reception of such arches or braces of such links as described.

I also claim the combination of the circular wheel, D, with the chain constructed with arches or braces to its links, and with the sprocket wheel made so as to support the links at their junctions, and with recesses or spaces for receiving the link arches in manner as specified.

I also claim the application of each bucket to the claims by means of a rod running through the bucket and supported in bearings applied to the chains as described.

I also claim the arrangement and combination of the sinkers, s s, with the bucket, the chains, the bucket rods and the sprocket wheels as described

44,790.—Force Pumps.—Joseph De Long, Upper Sandusky, Ohio.

First, I claim the arrangement of the single double-acting valve, d, with the intermediately perforated cylinder, A, solid piston A′, and valve chamber, C, the whole constructed and operating substantially in the manner described.

Second, The arrangement of the removable screw seat, e, constructed with a passage through it, with the poppet valve, d d′, and the perforated cylinder, A, substantially in the manner and for the purpose described.

44,791.—Hand Cards.—Edgar S. Ells, Fairhaven, Vt., and George F. Ells, Troy, N. Y.

We claim, first, A card having a wooden handle, A, fastened in a mortise or recess, d, in a wooden stock, B, by means of the wire teeth, C, of the card, substantially as herein described.

And we also claim a hand card having the projecting ends of its wire teeth brushed smooth and rounding, substantially as herein described.

44,792.—Pumps.—A. V. & A. F. Fletcher, Athol, Mass.:

We claim the construction and application of the fulcrum post substantially as set forth.

We also claim the combination of the rings, t q, plate, s, cylinder, a, base, c, and pipe, d, when constructed and arranged to operate together substantially as set forth.

44,793.—Bracing and Fastening Spiral Springs for Mattresses.—Orlando Fuller, San Francisco, Cal.:

I claim the employment or rise of a supporting web adjusted by the means and in the manner set forth, at or near the centers of the springs, and the attachment thereto of the upper coils of the springs in the manner and for the purposes set forth.

44,794.—Hose Couplings.—A. M. George, Nashua, N. H.:

I claim the hose coupling constructed and operating substantially as within described.

[This invention consists in making hose couplings so that they can be fixed and unfixed instantaneously, and yet be secure from accidental unlocking; and further, that they will not become unserviceable by reason of ice in winter, or by collections of sediment about their joints, and that the locking device shall not require skill in operating it.]

44,795.—Hay Presses.—Gilbert Gibbs, Sugar Branch, Ind.:

I claim, first, In combination with the beater, D, a removable platen or follower, K, when employed in permanently compressing the bale after it has been packed or temporarily compressed by the beater substantially as specified.

Second, In the construction of the platen, K, the catches, g h, jointed bars, g′ h′, bar, i, pin, s, in combination with the notched pieces, h″, substantially as and for the purposes specified.

Third, I claim operating the platen for permanently compressing the bale by means of the cam or eccentric levers, H, acting upon friction rollers, n, and shoulders, o, or their equivalents carried by side pieces, h″, which draw upon the follower or platen substantially in the manner described.

Fourth, Closing the door, I, by the action of the beater, D, in its ascent, and releasing the same to be opened again in its descent, in combination with any appropriate mechanism for the purpose substantially as herein described.

44,796.—Clothes Wringer.—Reuben Gipson, Shelby, Ohio:

I claim the adjustable arms, H H and L L, and gear s G I J K, in combination with the rollers, B and C, when operating conjointly as and for the purpose substantially as set forth.

44,797.—Filters.—Lyman A. Gouch, Yonkers, N. Y.:

I claim the cylinder, A, constructed as described in combination with the filtering media, D, screws, e, bolts, f, and perforated plates, C, for the purpose set forth.

44-798.—Breech-Loading Fire-Arms.—Henry Hammond, Providence, R. I.:

First, I claim the method substantially as described of constructing the breech block, E, with an oblique or helical rear surface, and connecting the same with the stock or frame, so that in opening and closing the breech block by rotation it will be withdrawn laterally and obliquely backward, as herein described.

Second, The oblique or spiral-faced stationary cam or recoil piece, F, in combination with the oblique groove, b, in the pin, C, and the pin, c, in the hub of the breech piece, when constructed and arranged as herein specified.

44,799.—Fruit Ladder.—James Hannan, South Lyon, Mich.:

I claim, first, The adjustable rounds, f f, with the catches, f′ f′, or their equivalents, in combination with the adjustable table, F, for the purpose set forth.

Second, I claim coupling or combining the sections, B and H, Fig 4 (either two or more sections) forming a combined, adjustable, and extension ladder, in the manner and for the purpose set forth.

44,800.—Coal-oil Lamp.—Harvey J. Harwood, Utica, N. Y.:

I claim, first, The spiral ventilator, as constructed and described.

Second, The arrangement of the additional sliding tube, as described, so as to be detached readily to change the lamp by the removal of the outer tube, as set forth.

Third, The arrangement of the curtain chamber in combination with the spiral ventilator, to secure the lamp against dripping oil when turned upon the side.

44,801.—Seeding Machine.—Henry K. Horton, Campton, Ill.:

I claim the combination and arrangement of the seed-coverer, O, and the hinged frames, U and C, when constructed and operating substantially as herein specified.

44,802.—Weather Strip.—W. R. S. Hunter, Blackberry Station, Ill.:

I claim a device to be used as a weather strip for the bottom of doors, when constructed with two vertical shoulders, d and e, shutting against each other beneath a horizontal projecting shelter, i, and provided with a water channel, g, to catch and convey away any water that may pass through the joint between D and E, substantially as described.

44,803.—Bracket and Chandelier Lamp.—James Ives, Mount Carmel, Conn.:

I claim, first, Making the lamp adjustable while its cone or chimney seat is stationary, substantially as and for the purpose set forth.

Second, A stationary stopple for the filling hole of a movable lamp.

Third, A stationary cone or chimney base, substantially as and for the purpose set forth.

Fourth, A movable lamp, substantially as and for the purpose set forth.

Fifth, A hinged support for the lamp, substantially as and for the purpose set forth.

Sixth, The combination of the stationary bracket hinged lever support with lamp attached and a spring, substantially as and for the purpose set forth.

44,804.—Washing Machine.—Josee Johnson, New York City:

I claim in connection with a pounder, B, the employment of a roller, E, arranged as described, with or without guiding links, so as to operate in combination with the pounder, substantially in the manner and for the purpose herein set forth.

44,805.—Horse Hay-fork.—L. G. Kniffen, Worcester, Mass.:

I claim the handle, B, cast with a recess, c, at its lower part, and with a hood projection, f, and attached to the central tine, A′, of a three-tine fork, as described, in connection with the catch, C, and spring, e, all arranged to form a new and improved horse hay-fork, as described.

[This invention relates to an improvement in that class of horse hay-forks which are constructed wholly of metal, and it consists in combining a handle and catch of novel construction with the tines of the fork, in such a manner that several advantages are obtained over the ordinary forks now used. A premature or casual tripping of the fork being prevented, and a very simple, cheap, and durable fork obtained, and one which may be manipulated with the greatest facility.]

44,806.—Machine for Cutting Soap.—Ross Johnson, Urbana, Md.:

I claim, first, Arranging the wire cutters in a single frame, C, and in planes at right angles to each other, so that during the act of making one cut, the wires for making the succeeding cut will be brought in their proper position for this purpose, substantially as described.

Second, The vertically movable wire frame, C, in combination with the horizontally reciprocating frame, B, substantially as described.

Third, Mounting the cutter carrying frame upon a carriage which is adapted to enclose or partly enclose the mass of soap to be cut while the latter remains upon the floor or blocks, substantially as described.

Fourth, A vertically movable frame, C, horizontally reciprocating frame, B, and a movable carriage, A A′ A′, all combined and operating substantially as described.

Fifth, Cutting "frames" of soap into bars by means of machinery without the necessity of removing the "frame," or soap from the blocks upon which they are left standing after being molded, substantially as described.

44,807.—Machine for Boring Wagon Hubs.—Jacob Kritch, Rochester, N. Y.:

I claim the combination of the adjustable revolving hub-head or socket, H, capable of being set at any angle laterally, and the non-revolving feeding cutter-shaft, B, the whole so arranged as to cut a tapering hole, substantially as herein described.

I also claim the arrangement of the adjustable revolving hub-head or socket, H, disk, K, ring, L, and centering screws and nuts, f g, for centering and sustaining the hub while being bored, substantially as herein set forth.

I also claim the threading cutter, D, provided with the angular cutting points, m m′, for producing the threads on the inside of the hub, substantially as described.

44,808.—Power Loom for Weaving Hair Cloth.—Isaac Lindsley, Pawtucket, R. I.:

I claim, first, Controlling the operations of the selecting mechanism by means of a detector constructed and operating substantially as described.

Second, I claim the mode of operation substantially as specified by which in case the selecting instrument fails to select and present a length of weft to the instrument that places it in the open shed during the period allotted therefore, its selecting function is in consequence thereafter suspended during any determined number of picks and resumed with the reopening of the proper shed, and so continues to suspend and resume its function automatically until a length of weft is selected and inserted in the proper shed, and to do so repeatedly as often as such contingency occurs.

44,809.—Blowing Apparatus.—P. W. Mackenzie, Jersey City, N. J.:

I claim the combination of the hollow axle, J, and the straight shaft, C, with the fans, B, and the drum, D, substantially as and for the purpose set forth.

44,810.—Corn Planter.—Robert McCorkell, Warsaw, Minn. Ante-dated Oct. 22, 1864:

I claim, first, The device or manner of moving the movable seat by the lever, v, operated by the foot when used in corn planters, as specified.

Second, The hinged beam, H, the tubular tooth, C, the oblique rotary cutter, b, the reversed share and adjustable roller, k, arranged as and for the purpose set forth.

Third, The levers, M M and m, with the connecting rod, o, for the purpose of elevating or depressing the beams, H H, with their use for that purpose, as set forth and described.

44,811.—Machine for Mangling Beefsteak and other Meats.—Robert McCorkell, Warsaw, Minn. Ante-dated Oct. 18, 1864:

I claim, first, The construction of rollers having ridges and depressions as described and arranged in relation to each other in such a manner that the ridges and depressions shall come opposite to or bear upon each other, for the purpose specified.

Second, The handle, H, and bar, G, with the levers, F F, and hooks, k, for the purpose set forth substantially as described.

44,812.—Coal or Heating Stove.—Josiah V. Meigs, Washington, D. C.:

I claim, first, A jacket or sleeve surrounding and sliding upon a stove leaving a central opening substantially as described for the purpose of rendering it an air-tight, or an open stove at will, as set forth.

Second, The combination of the hinged pawls, L L′, with the ratchets and stove, substantially as and for the purpose set forth.

44,813.—Faucet.—Andrew J. Morse, Melrose, Mass.:

I claim the improved cock, as constructed with a chamber surrounding the conduit through the same, or arranged in juxtaposition therewith.

44,814.—Foot Bellows.—Henry Neumeyer, Macungie, Pa.:

I claim the two bellows, B B, in combination with the wind chamber, F, and arranged and applied to the central board or plate, A, and provided with the necessary valves, to operate substantially as and for the purpose herein set forth.

44,815.—Hook and Eye.—H. Nickolds, Providence, R. I.:

I claim a hook, A, made substantially as shown as a new article of manufacture.

44,816.—Coal Stove.—Sanford E. Parsons, Wilkesbarre, Pa.:

I claim, first, Providing the passage for the removal of cinders from the stove with a door which constitutes a part of the fire-wall, e, and also a part of the outer wall of the fire-pot, substantially as described.

Second, Hinging one of the fire-bricks of the lining, e, to the wall of the stove, substantially as described.

44,817.—Process for Purifying Coal and Ores.—Benjamin F. Penniman, New York City:

I claim the process substantially as described of mixing coal or other mineral with acid and alkaline agents consisting of caustic soda, carbonate of soda, nitric acid and borax and subjecting them to the action of steam, in the manner and for the purpose specified.

44,818.—Machine for Finishing Nuts.—Frank P. Flieghar & Wm. Schollhorn, New Haven, Conn.:

We claim, first, The successive use of a reamer, D, punch or punches, E E*, milling tools, F F*, and tops, G G*, in a machine for finishing nuts, constructed and operating in the manner and for the purpose substantially as herein shown and described.

Second, The use of milling tools, F F*, arranged substantially as herein specified, for the purpose of cleaning off the faces of a nut.

Third, The steps, e, in the channel, C, arranged substantially as and for the purpose set forth.

Fourth, The reversing gear, I I′ J, clutch, K, and switch lever, L′, or their equivalents arranged in combination with the wheels, b E3 h, which impart motion to the various tools, in the manner and for the purpose substantially as herein specified.

Fifth, The adjustable shoulders, l l′, applied in combination with the switch lever, L′, and with the reversing gear, substantially as and for the purpose herein described.

Sixth, The automatically reciprocating rod, p′, and finger bar, g′, applied in combination with the channel, C, and tools, D E E* F F* G G*, in the manner and for the purpose substantially as described.

Seventh, The arm, p3, and inclined plane, r, in combination with the reciprocating rod, p′, finger bar, g′, and channel, C, constructed and operating substantially as and for the purpose set forth.

44,819.—Machine for Crushing Ores.—John T. Plass, New York City:

I claim, first, The globular or nearly globular prestle, h, setting into the mortar, i, and moved by the shaft, g, and arm, f, in combination with the adjustable spring, p, whereby said pestle is pressed to its work with the desired force, as set forth.

Second, I claim a stationary wheel, l, and pinion, k, on the shaft, g, in combination with the pestle, h, and mortar, i, to communicate to said pestle the movements specified.

Third, I claim the circular basin, g, and rollers. r, in combination with the pestle, h, and mortar, i, for the purposes and as specified.

44,820.—Washing and Scouring Machine.—Wm. Price, Cincinnati, Ohio:

I claim, first, The arrangement and combination of the presser feeding rollers, and a high speed revolving brush, the same acting upon the material, as it slowly passes over a compensating roller, in the manner as and for the purpose specified and in combination with the above.

Second, I claim the construction of the double-yielding compensating journal boxes, applied for the purposes herein set forth.

44,821.—Roofs.—Joseph Rodefer, Cincinnati, Ohio:

I claim the mode of constructing a roof with slates or tiles secured upon a concrete or mortar bed, B, by means of gutters, C, and luting, F, in the manner set forth.

44,822.—Mode of Securing Bits in Braces.—C. B. Rose, Sunderland, Mass.:

I claim a fastening for securing bits in braces, composed of a sliding bolt or latch, C, operated by a key, D, arranged in the manner substantially as herein shown and described.

[This invention relates to a new and improved mode of securing bits in joiners' braces, and it consists in placing a sliding bolt or catch in the end of the brace and operating the same by means of a key; all being arranged in such a manner that the bit may be firmly secured in the brace and released therefrom by a positive movement of the bolt or catch, all springs being avoided, and a very simple and durable fastening obtained for the purpose specified.]

44,823.—Mode of Securing Bits in Braces.—C. B. Rose, Sunderland, Mass.:

I claim the sliding bolt or latch, C, in combination with the collar, D, provided with the two cams or eccentric grooves, d d′, all being arranged and applied to the end, A, of the brace to operate in the manner substantially as and for the purpose set forth.

[This invention relates to a new and improved fastening for securing bits in braces, and it consists in the employment or use of a sliding bolt or latch in connection with a double cam formed within a collar which is fitted on the end of the brace and arranged so as to operate on the bolt or latch to secure the shank of the bit in the brace and release it therefrom by simply turning the collar.]

44,824.—Revolving Hand-rake.—Samuel C. Rundlett, Portland, Maine:

I claim the revolving rake, A, in combination with the arms, B B′, connected by the cross-bar, C, the springs, G G, lever, D, spring, E, and the lips, g g, on the head, a, and with or without the guide, F, all arranged to operate in the manner substantially as and for the purpose set forth.

[This invention relates to a new and improved revolving hay rake designed for manual operation, or to be drawn along by hand. The object of the invention is to obtain a simple device for the purpose specified, and one which may be operated with facility and without great exertion or labor.]

44,825.—Smut Mill.—John Russell, Cumberland, Md.:

I claim the combination of the conical or hemispherical toothed beater, I, the corrugated rubbers, H h H h, the short internal perforated cylinders, O O, and the long external perforated casing cylinder, N, with the fan, G, and suction pipe, S, when the top of the annular space between the internal and external cylinders is closed by the flat ring, a, or by any other suitable device, and the perforations in the casing cylinder are all formed at points above the said flat ring, a, all for the purpose of directing and controlling the passage of the artificially created currents of air through the machine, in the manner herein set forth.

44,826.—Carriage.—Blaney E. Sampson, Boston, Mass.:

I claim the application or combination of one or more auxiliary seats, movable bars or rests, C, with a carriage seat, substantially in manner and so as to operate as and for the purpose specified.

I also claim the combination of such an auxiliary bar or seat, C, with the main seat and either or both the arm rests thereof

I also claim the arrangement and application of such an auxiliary seat, C, with the arm rest of the main seat so as to be capable of being moved relatively thereto, and into either position with respect to it, substantially as hereinbefore described.

I also claim the construction of one or more of such auxiliary seats or movable bars, C, with one or more recesses or equivalents for receiving a part of another bar or a projection from such bar in manner and for the purpose set forth.

44,827.—Gun Lock.—Cornelius W. Scott, Constantina, Ohio:

I claim, first, The combination of the coiled or spiral spring, m the stiffening and guiding rod, l, the adjusting nut, n, and the tumbler, w, as described, that is to say; in such a manner that the pressure of the spring and the consequent force of the blow of the hammer may be readily and properly adjusted, while at the same time the spring is kept from being thrown injuriously out of line by the pressure thrown upon it, substantially as and for the purpose set forth.

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Second, The combination of the arms, p and r, of the toggle joint, o, the tumbler, w, and the trigger, x, as described, that is to say, one of the arms of the toggle joint being connected to the tumbler, w, and the other to a support independent of the trigger, and the trigger being so arranged with relation to the toggle joint as to operate directly to move the bearing which connects the two parts of the latter, to the opposite side of the line from that which it naturally occupies when the gun stands at full cock, and thus allow the hammer to fall, substantially as and for the purpose set forth.

44,828.—Cotton Picker.—Hennell Stevens. Memphis, Tenn.:

I claim, first, The fingers, A, arranged as shown to form an inclined surface, and provided with notches, a, at their upper parts, substantially as and for the purpose specified.

Second, The shield, E, in connection with the fingers, A, and picker, B, arranged to operate substantially as and for the purpose set forth.

Third, I claim the picker, B, placed at such a distance from the fingers, A, that the unripe balls may pass beneath it without being touched, while those in which the cotton protrudes are entangled and the cotton extracted from them.

Fourth, The comb, G, in connection with the picker, B, shield, E, fingers, A, and receptacle, C, all arranged to operate as set forth.

44,829.—Hydraulic Pump.—Edwin Squire, Cold Springs, N. Y.:

I claim, first, The levers, F G I, and links, g i, in combination with the hand lever, h, and supply and waste valves, D E, constructed and operating in the manner and for the purpose substantially as herein shown and described.

Second, The combination of the supply valves, D D', and waste valves, E E', with oscillating levers, F G I, and hand levers, h h', constructed and operating in the manner and for the purpose substantially as herein specified.

[This invention consists in the arrangement of two oscillating levers and suitable connecting rods in combination with the waste valve and supply valve of a hydraulic press or other similar machine, and with a suitable hand lever in such a manner that by one and the same motion of said hand lever the waste valve is closed when the supply valve is opened, and *vice versa*, and the construction of the press is thereby simplified and its operation facilitated. The invention consists also in combining two sets of waste and supply valves with suitable levers, in such a manner that two presses can be operated simultaneously by the motion of one and the same hand lever, one press being made to discharge, while the other takes water and *vice versa*, and each press being made to operate without interfering in the least with the continuous operation of the other.]

44,830.—Slide Valve for Steam Engines.—D. F. Walker, Potosi, Mo.:

I claim a valve, B, provided with a stud, d, and cap, f, and operating in combination with the steam chest, A, in the manner and for the purpose substantially as herein shown and described.

44,831.—Roofs of Churches.—Shepherd S. Woodcock, Somerville, Mass., and George F. Meacham, Watertown, Mass.:

We claim supporting the roof of a building by means of trusses, B, steadied and held in place by wind braces, b d, in the manner substantially as set forth.

44,832.—Scrubber and Mop.—Wm. S. Bullen (assignor to himself and Wm. O. McIntire), Indianapolis, Ind.:

I claim the combination of scrubber, D, and mop cloth, E, in one and the same machine, i.e., the mop-head, A, with a deep groove in the under side, and compresser rod, B, operated by thumb-screws, C, firmly clamping and holding in place the mop cloth, E, and scrubbing rubber, D, constituting thereby a combined mop and scrubber in one machine.

44,833.—Parlor and Cooking Stove.—David B. Cox and John T. Davy (assignors to David B. Cox and Harvey Church), Troy, N. Y.:

We claim, first, The flue pipes, G G and H (more or less) passing through from the top of the oven to the bottom of the same, in combination with the oven space, J, having fire-chamber and ash space directly over the oven, as described and set forth.

Second, We claim the hook or fulcrum, F, attached to or cast on the stove, in combination with the shaking grate, D, operating in the manner and for the purposes set forth.

44,834.—Driving Wheel of Harvesters.—Daniel L. Emerson, Rockford, Ill., assignor to Mary Manney, Winnebago county, Ill.:

I claim a harvester driving wheel constructed with a tubular rim, substantially as set forth.

I also claim the combination of the tubular rim of the wheel with the cog teeth of the main driving wheel, in such manner that said rim forms the base of said teeth, substantially as set forth.

44,835.—Furnace.—Samuel E. Foster (assignor to himself and Henry F. Cogshall), Fitchburg, Mass.:

I claim in the air-heating furnace or fire-drum and the surrounding air-heating chamber having the fuel throat arranged within the top of the air chamber and with respect to the fuel opening of the top of the fire drum, substantially as specified, and the ash-pit or fire-drum provided with an air induction pipe and a valve thereto, as explained, the described arrangement of the grate with respect to the doorway or throat of the ash-pit or chamber.

And I also claim the construction of each grate bar with a bottom projection, f, having a length so much less than the distance between the supporting bars as may be necessary to allow of the grate bar being moved longitudinally back and forth on its supports sufficiently for the purpose of causing the ashes to be discharged from the fire-drum and between the grate bars.

44,836.—Churn.—Moses Neal (assignor to Neal & Finck), Kalamazoo, Mich.:

I claim the combination of the dashers with the cup-shaped detachable beaters, constructed, arranged, and operating substantially as described and represented.

[In this churn currents and counter-currents are produced which causes the cream to collide and surge in such a manner that the churning is rapidly effected.]

44,837.—Construction of Monitor Vessels.—Samuel Parr (assignor to himself. James A. Fox, and John A. Robertson), Boston, Mass.:

I claim the improved monitor or armored vessel as made with the combination of the transverse strengthening partitions with the opposite layers of wood, the cork and iron arranged together, substantially as specified.

44,838.—Machine for making Horse Shoes.—Charles H. Perkins (assignor to the Union Horse Shoe Company), Providence, R. I.:

I claim the combination of a series of punches with a die, constructed as herein described, operating substantially as and for the purposes specified.

44,839.—Machine for making Horse Shoes.—Charles H. Perkins (assignor to the Union Horse Shoe Company), Providence, R. I.:

I claim the combination of the compound feeding roller and cutter, C C', and the friction roller, A, substantially as described for the purposes specified.

44,840.—Machine for making Horse Shoes.—Charles H. Perkins (assignor to the Union Horse Shoe Company), Providence, R. I.:

I claim the method of thickening the ends of horse shoe blanks by the combination of the dies, C and C', when constructed and operated in the manner substantially as described for the purpose specified.

44,841.—Hoop Skirt.—Julius Waterman, New York City, assignor to himself and Joseph Mayer, Brooklyn, N. Y.:

I claim the introduction of the clasps that unite the ends of the skirt hoops or springs within the pockets formed in the woven tape, substantially as and for the purposes specified.

And in combination therewith I claim the spangles or small clasps introduced near the edges of the tape on each side of the clasp that holds the ends of the wires together, as and for the purposes specified.

44,842.—Press.—Joseph P. White (assignor to himself and Thomas Gannon), New York City:

I claim the worms, E, toothed racks, D, with or without bevel gears, c d, in combination with the worms, g, and worm wheels, h, and with the follower, C, of a press-box, constructed and operating substantially as and for the purpose set forth.

44,843.—Injector for the Hair.—Austin A. Smith, Seneca Falls, N. Y.:

I claim, first, Forming the elastic rim, A, with its sides, a a, so situated and formed that compressing the sides will gradually close the vacuum chamber, from the angle of the periphery, inward toward the center, so as to expel all the fluid, substantially as set forth.

Second, I also claim constructing the vacuum buib with rigid sides or plates, B B, in combination with the elastic ring, A, substantially in the manner and for the purposes described.

Third, I also claim in combination with the flexible vacuum bulb, A B, the series of distributing tubes, D, so constructed as to inject a fluid beneath the hair in small jets, substantially as set forth.

Fourth, I also claim the hollow teeth or tubes, D, formed with the eduction orifice, d, on the under concave side thereof, to prevent the same from becoming obstructed, and to direct the fluid downward upon the scalp, and to prevent scratching or tearing, substantially as set forth.

Fifth, I also claim making the neck or base to which the tubes, D, are attached, flexible, so as to render them capable of bending separately or together, to adjust themselves to the form of the head, in whatever position they may be applied, substantially as set forth.

RE-ISSUES.

1,798.—Pressure Bell.—Wm. L. Bradley, Nathaniel L. Bradley, and Walter Hubbard, West Meriden, Conn., assignees by mesne-assignments of Jason Barton, Middle Haddam, Conn. Patented April 8, 1856:

We claim the combination and arrangement of the bell, striking instrument arranged to swing in a plane substantially at right angles with the plane of the rim of the bell, and piston extending through the axis of the bell, these three operating substantially as set forth.

We also claim the combination of the bell, striking instrument, piston, and curved stand, whereby the striking instrument is permitted to swing across the bell in a plane substantially at right angles with the plane of the rim of the bell, substantially as set forth.

We also claim the combination of the bell, striking instrument, piston, and stand, substantially as described, so that the piston strikes another part of the apparatus before the hammer strikes the bell, in a plane substantially at right angles with the plane of the rim of the bell, substantially as set forth.

1,799.—Apparatus for manufacturing Cube Sugar.—Gustavus Finken, Brooklyn, N. Y. Patented Aug. 20, 1861. Re-issued Feb. 4, 1862:

I claim the formation of the cubes, blocks, or lumps from the granular sugar in the manufacture of what I have herein specified as embraced by the term "cube sugar," by means of machinery composed of an endless or rotating series of molds fitted with compressing and discharging pistons, and having applied in combination with them a cam or cams, or their equivalent, for operating the pistons one or more at a time in regular succession throughout the whole of the series, substantially as herein described.

1,800.—Straw-cutter.—Warren Gale, Chicopee Falls, Mass. Patented Sept. 12, 1854. Re-issued April 3, 1860:

I claim, first, Connecting the cutting and the pressure cylinders of cutters for hay, straw, or other substances, by gearing or its equivalent, in such manner that the knife or each of the knives upon one cylinder shall at every revolution be caused to come into actual contact with the other cylinder or with some part of the other cylinder, at any desired point to which the parts may be adjusted.

Second, The employment in a straw or other cutter of a revolving cutting cylinder, having one or more knives, in combination with a pressure cylinder having one or more radial flanges, arms, or projections, and so arranged that the feed is caught between the two, drawn forward and cut off by the pressure between the knife on one cylinder and the flange on the other.

Third, Forming those parts of the pressure cylinder against which the knife or knives are made to cut, in sections or strips, separate from the body of the cylinder, substantially as and for the purpose set forth.

Fourth, Combining with the feed-box of a straw or other cutter an adjustable throat, having a mode of operation, substantially as set forth.

Fifth, Combining, substantially as set forth, an automatically operating throat, with the cutting cylinder of a straw or other cutter, in such a manner as to diminish the number of knives heretofore employed in ordinary cutters.

1,801.—Knitting Machine.—Moses Marshall, W. Aldrich, and L. B. Tyng (assignees of said Moses Marshall), Lowell, Mass. Patented March 15, 1853:

I claim, first, Forming the stitches alternately on each side of the needle rests by two sets of needles placed at an angle to each other, and operating one needle at a time, substantially as described.

Second, The two plates or rests, e and f, or their equivalents, so arranged as to support the two sets of needles, and allow the fabric knit to pass between them, substantially as described.

Third, Connecting the cam boxes, i i, which actuate the opposite sets of needles, by means of the arm, l l, or its equivalent, so as to give the proper alternate and relative movements to said sets of needles, substantially as described.

Fourth, Connecting the feeder, which carries the thread, with the arm which connects the cam-boxes, substantially as and for the purpose described.

Fifth, Two sets of single and independent needles crossing at an angle to each other, and those of each set moving in direct or parallel lines, and the two sets operating alternately on each side of said angle, substantially as and for the purpose described.

1,802.—Revolving Fire-arm.—Rollin White, Springfield, Mass. Patented April 13, 1858:

I claim combining with a fixed barrel a many-chambered rotating cylinder, the chambers of which are made of a cylindrical form to within a short distance of the front end, and there formed with a contraction of less caliber than the diameter of the bell, when such contracted front end is free to move longitudinally from the breech, substantially as and for the purpose specified.

And I also claim in combination with the chambers formed with a contraction at the front end, substantially as specified, the making of the cylinder in two or more parts, so connected that they shall rotate together and be free to separate longitudinally, substantially as and for the purpose specified.

And I also claim the combination of a fixed barrel, a rotating cylinder having a series of chambers extended entirely through it, so placed and rotated that the several chambers may in succession be brought in line with the barrel, and a rotating breech plate to close up the rear end of the chambers of the cylinder, and which is separable from, although it rotates with, the cylinder, substantially as and for the purpose specified.

EXTENSION.

Making Paraffine Oil.—James Young, Manchester, England. Patented March 23, 1852. Ante-dated Oct. 7, 1850:

I claim the obtaining of paraffine oil, or an oil containing paraffine, and paraffine, from bituminous coals, by treating them in manner herein-before described.

TO OUR READERS.

INVARIABLE RULE.—It is an established rule of this office to stop sending the paper when the time for which it was pre-paid has expired.

MODELS are required to accompany applications for Patents under the new law, the same as formerly, except on design patents, when two good drawings are all that are required to accompany the petition, specification and oath, except the Government fee,

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MESSRS. MUNN & CO.:—I take pleasure in stating that, while I held the office of Commissioner of Patents, MORE THAN ONE-FOURTH OF ALL THE BUSINESS OF THE OFFICE CAME THROUGH YOUR HANDS. I have no doubt that the public confidence thus indicated has been fully deserved, as I have always observed, in all your intercourse with the office, a marked degree of promptness, skill, and fidelity to the interests of your employers. Yours very truly,

CHAS. MASON.

Judge Mason was succeeded by that eminent patriot and statesman, Hon. Joseph Holt, whose administration of the Patent Office was so distinguished that, upon the death of Gov. Brown, he was appointed to the office of Postmaster-General of the United States. Soon after entering upon his new duties, in March, 1859, he addressed to us the following very gratifying letter:

MESSRS. MUNN & CO.:—It affords me much pleasure to bear testimony to the able and efficient manner in which you discharged your duties as Solicitors of Patents, while I had the honor of holding the office of Commissioner. Your business was very large, and you sustained (and I doubt not justly deserved) the reputation of energy, marked ability, and uncompromising fidelity in performing your professional engagements.

Very respectfully, your obedient servant,

J. HOLT

Hon. Wm. D. Bishop, late Member of Congress from Connecticut, succeeded Mr. Holt as Commissioner of Patents. Upon resigning the office he wrote to us as follows:

MESSRS. MUNN & CO.:—It gives me much pleasure to say that, during the time of my holding the office of Commissioner of Patents, a very large proportion of the business of inventors before the Patent Office was transacted through your agency; and that I have ever found you faithful and devoted to the interests of your clients, as well as eminently qualified to perform the duties of Patent Attorneys with skill and accuracy. Very respectfully, your obedient servant,

WM. D. BISHOP.

THE EXAMINATION OF INVENTIONS.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submit it to us, with a full description, for advice. The points of novelty are carefully examined, and a written reply, corresponding with the facts, is promptly sent, free of charge. Address MUNN & CO., No. 37 Park Row, New York.

As an evidence of the confidence reposed in their Agency by inventors throughout the country, Messrs. MUNN & CO. would state that they have acted as agents for more than TWENTY THOUSAND inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of inventors and patentees, at home and abroad. Thousands of inventors for whom they have taken out patents have addressed to them most flattering testimonials for the services rendered them; and the wealth which has inured to the individuals whose patents were secured through this office, and afterwards illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! Messrs. MUNN & CO. would state that they never had a more efficient corps of Draughtsmen and Specification Writers than those employed at present in their extensive offices, and that they are prepared to attend to patent business of all kinds in the quickest time and on the most liberal terms.

PRELIMINARY EXAMINATIONS AT THE PATENT OFFICE.

The service which Messrs. MUNN & CO. render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there; but is an opinion based upon what knowledge they may acquire of a similar invention from the records in their Home Office. But for a fee of $5, accompanied with a model, or drawing and description, they have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a patent, &c., made up and mailed to the inventor, with a pamphlet, giving instructions fo further proceedings. These preliminary examinations are made through the Branch Office of Messrs. MUNN & CO., corner of F. and Seventh streets, Washington, by experienced and competent persons. Many thousands of such examinations have been made through this office, and it is a very wise course for every inventor to pursue Address MUNN & CO., No. 37 Park Row, New York.

HOW TO MAKE AN APPLICATION FOR A PATENT.

Every applicant for a patent must furnish a model of his invention if susceptible of one; or, if the invention is a chemical production, he must furnish samples of the ingredients of which his composition consists, for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the Government fees, by express. The express charge should be pre-paid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by a draft on New York, payable to the order of Messrs. MUNN & CO. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but, if not convenient to do so, there is but little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & CO., No. 37 Park Row, New York.

Patents are now granted for SEVENTEEN years, and the Government fee required on filing an application for a patent is $15. Other changes in the fees are also made as follows:—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Re-issue	$30
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Laws, enacted by Congress on the 2d of March, 1861,

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now in full force, and prove to be of great benefit to all parties who are concerned in new inventions.

The law abolishes discrimination in fees required of foreigners, excepting natives of such countries as discriminate against citizens of the United States—thus allowing Austrian, French, Belgian, English, Russian, Spanish and all other foreigners, except the Canadians, to enjoy all the privileges of our patent system (except in cases of designs) on the above terms. Foreigners cannot secure their inventions by filing a caveat; to citizens only is this privilege accorded.

CAVEATS.

Persons desiring to file a caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention The Government fee for a caveat is $10. A pamphlet of advice regarding applications for patents and caveats is furnished gratis, on application by mail. Address MUNN & CO., No. 37 Park Row, New York.

REJECTED APPLICATIONS.

Messrs. MUNN & CO. are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of their Washington Agency to the Patent Office affords them rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Their success in the prosecution of rejected cases has been very great. The principal portion of their charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted, are invited to correspond with MUNN & CO., on the subject giving a brief history of the case, inclosing the official letters, &c.

FOREIGN PATENTS.

Messrs. MUNN & CO., are very extensively engaged in the preparation and securing of patents in the various European countries. For the transaction of this business they have offices at Nos. 66 Chancery lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. They think they can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through their agency.

Inventors will do well to bear in mind that the English law does not limit the issue of patents to inventors. Any one can take out a patent there.

Circulars of information concerning the proper course to be pursued in obtaining patents in foreign countries through MUNN & CO'S Agency, the requirements of different Government Patent Offices, &c., may be had, gratis, upon application at the principal office, No. 37 Park Row, New York, or any of the branch offices.

SEARCHES OF THE RECORDS.

Having access to all the official records at Washington, pertaining to the sale and transfer of patents, MESSRS. MUNN & CO., are at all times ready to make examinations as to titles, ownership, or assignments of patents. Fees moderate.

INVITATION TO INVENTORS.

Inventors who come to New York should not fail to pay a visit to the extensive offices of MUNN & CO. They will find a large collection of models (several hundred) of various inventions, which will afford them much interest. The whole establishment is one of great interest to inventors, and is undoubtedly the most spacious and best arranged in the world.

MUNN & CO. wish it to be distinctly understood that they do not speculate or traffic in patents, under any circumstances; but that they devote their whole time and energies to the interests of their clients.

COPIES OF PATENT CLAIMS.

MESSRS. MUNN & CO., having access to all the patents granted since the rebuilding of the Patent Office, after the fire of 1836, can furnish the claims of any patent granted since that date, for $1.

THE VALIDITY OF PATENTS.

Persons who are about purchasing patent property, or patentees who are about erecting extensive works for manufacturing under their patents, should have their claims examined carefully by competent attorneys, to see if they are not likely to infringe some existing patent, before making large investments. Written opinions on the validity of patents, after careful examination into the facts, can be had for a reasonable remuneration. The price for such services is always settled upon in advance after knowing the nature of the invention and being informed of the points on which an opinion is solicited. For further particulars address MUNN & CO., No. 37 Park Row New York.

EXTENSION OF PATENTS.

Many valuable patents are annually expiring which might readily be extended, and if extended, might prove the source of wealth to their fortunate possessors. Messrs. MUNN & CO. are persuaded that very many patents are suffered to expire without any effort at extension, owing to want of proper information on the part of the patentees, their relatives or assigns, as to the law and the mode of procedure in order to obtain a renewed grant. Some of the most valuable grants now existing are *extended patents*. Patentees, or, if deceased, their heirs, may apply for the extension of patents, but should give ninety days' notice of their intention

Patents may be extended and preliminary advice obtained, by consulting or writing to MUNN & CO., No. 37 Park Row, New York.

ASSIGNMENTS OF PATENTS.

The assignment of patents, and agreements between patentees and manufacturers, carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park Row, New York.

UNCLAIMED MODELS.

Parties sending models to this office on which they decide not to apply for Letters Patent and which they wish preserved, will please to order them returned as early as possible. We cannot engage to retain models more than one year after their receipt, owing to their vast accumulation, and our lack of storage room. Parties, therefore, who wish to preserve their models should order them returned within one year after sending them to us, to insure their obtaining them. In case an application has been made for a patent the model is in deposit at the Patent office, and cannot be withdrawn.

It would require many columns to detail all the ways in which the Inventor or Patentee may be served at our offices. We cordially invite all who have anything to do with patent property or inventions to call at our extensive offices, No. 37 Park Row, New York, where any questions regarding the rights of Patentees, will be cheerfully answered.

Communications and remittances by mail, and models by express (prepaid) should be addressed to MUNN & CO. No. 37 Park Row, New York.

Notes and Queries

W. F. M., of Mich.—You propose to draw canal boats along by a rope suspended over the middle of the canal; have you devised any plan for passing the supports? The resistance of water to the passage of vessels increases not directly in proportion to the speed, but more nearly as the square of the speed, which precludes the possibility of 75 miles an hour. Even if this speed could be obtained it would require the reconstruction of all existing canals, and the substitution of curves of very long radius in place of the present short curves, or the boats would run ashore from centrifugal force.

P. P., of Pa.—There is no alarm that we know of suitable to attach to barns to give warning of thieves, who may attempt to enter them, unless some one sleeps in the barn to hear the alarm. E. Holmes, No. 252 Broadway, has a patent for an electro-magnetic alarm bell, which has been introduced quite extensively into private residences. It is a very complete apparatus and when properly adjusted no window or door could be disturbed in the night without giving the alarm

H. P., of Mass.—We find upon examination that your application was rejected for the want of proper care in the preparation of the papers. Your invention has in our opinion both merit and novelty, and if the papers are properly prepared we see no reason why you cannot obtain a valid patent. In making an assignment you are required to put a five cent revenue stamp upon it. Upon a power of attorney to sell rights a fifty cent stamp is required.

E. P. L., of Iowa.—Water can be decomposed in several ways. The easiest is to drive steam through an iron tube filled with red hot iron fillings. The oxygen of the water combines with the iron, setting the hydrogen free. The cheapest plan on a large scale is said to be by the use of coke or coal. This was the plan employed for getting the hydrogen by which the city of Narbonne in France, was lighted. The apparatus was illustrated in the SCIENTIFIC AMERICAN some years ago.

H. P., of Maine.—The paddle-wheel described by you does not, we regret to say, embrace any novel features. Abner Chapman, of Vermont, obtained a patent several years ago for a wheel precisely on your plan. He employed spiral shaped buckets or paddles secured to radial arms, with an open space at the apex of the paddle. The wheel was tried here, but for some reason was not adopted.

S. C. C., of Mass.—Friction gearing is often made of iron but not flat-faced. A series of V-shaped grooves in one pulley fit projections in the other. The objections to cloth-faced pulleys are quite apparent we think without discussion. A wide belt of a given tension drives more than a narrow belt of the same tension because there are more superficial inches in contact on the larger. Though the pressure on each inch may be the same in both cases in the large pulley or belt there are more inches, and therefore it has greater power.

J. T., of N. Y.—Mr. Gillespie's idea in comparing the flying of a bird to a vessel sailing on the wind was, that when the forward edge of the wing is the higher and the bird is moving forward, the resistance of the air operates to keep the bird from falling, in the same way that the resistance of the water holds a vessel from drifting to leeward.

R. S. S. Harrison, Baltimore, Md., wishes to correspond with makers of flanged earthen pipe; not drain pipe.

J. U. B., of N. H.—We are not able to advise you in regard to employment. Many others are seeking for the same information. It is a bad time to change.

Money Received

At the Scientific American Office, on account of Patent Office business, from Wednesday, Oct. 19, 1864, to Wednesday Oct. 26, 1864:—

J. M., of N. Y., $25; E. D., of N. Y., $25; J. M., of N. Y., $25; A. C., of Cal., $22; H. L., of N. Y., $45; F. H. P., of N. Y., $35; H. F., of N. Y., $20; L. L., of N. Y., $20; T. K., of Conn., $20; F. & W., of N. Y., $15; C. E. L. H., of Conn., $22; E. S. C., of Mass., $20; T. M., of N. Y., $40; H. & S., of Ill., $20; B. B., of R. I., $25; M. B. & N. A. P., of Tenn., $16; S. M. S., of Iowa, $25; W. H. M., of Conn., $25; C. D. B., of Mich., $16; D. & R., of Conn., $15; Z. P. L., of Conn., $25; B. & H., of N. Y., $25; H. A. P., of Mass., $20; F. G. B., of Conn., $25; G. S., of Mass., $25; B. & P., of Mo., $25; J. H. P., of Conn., $16; B. R. H., of N. J., $25; G. W., of Mass., $35; M. M., of N. Y., $20; L. C., of N. Y., $40; J. E. R., of N. Y., $22; S. E. T., of N. J., $70; B. R. H., of N. J., $25; J. B., of N. Y., $60; E. S., of Mich., $20; A. C. C., of N. Y., $29; P. C. R., of Mass., $20; H. B., of N. Y., $20; P. L. S., of N. Y., $40; W. T., of N. Y., $15; C. R., of N. J., $20; C. H. B., of Mass., $25; G. C. M., of Ohio, $45; J. H. G., of Ohio, $25; G. W. B., of R. I., $15; J. M., of Mass., $15; T. H. W., of N. H., $25; J. G. S., of Mass., $35; J. N. A., of Iowa, $15; S. W. K., of Mass., $25; W. S. J., of N. J., $15; J. D. S., of N. Y., $25; F. J. E., of Ill., $25; J. R., of N. J., $25; J. D. B., of Ill., $12; C. F. D., of Maine, $25; M. & R., of N. Y., $60; J. B., of N. Y., $15; W. G. K., of Ind., $20; W. B. D., of Conn., $15; W. & M., of Ind., $20; J. H. C., of N. Y., $55; E. M. K., of Ohio, $20; J. H. C., of Mass., $25; R. & H. V. F., of Ind., $16; A. L. G., of Mo., $25; A. K. P. W., of Mass., $15; D. T. C., of Ill., $25; C. D. R., of N. Y., $30; T. N. D., of Ind., $35; A. R. D., of N. H., $40; J. E. P., of N. Y., $29; S. C. T., of Mich., $25; J. P. B., of Wis., $15.

Persons having remitted money to this office will please to examine the above list to see that their initials appear in it and if they have not received an acknowledgment by mail, and their initials are not to be found in this list, they will please notify us immediately, stating the amount and how it was sent, whether by mail or express.

Specifications and drawings and models belonging to parties with the following initials have been forwarded to the Patent Office, from Wednesday, Oct. 19, 1864, to Wednesday, Oct. 26, 1864:—

C. E. L. H., of Conn.; J. R., of N. J.; M. M., of N. Y.; L. C., of N. Y.; J. E. R., of N. Y.; M. & R., of N. Y. (2 cases); B. R. H., of N. J.; G. C. M., of Ohio; C. H. B., of Mass.; D. O., of Ill.; J. G. S., of Mass.; S. W. K., of Mass.; S. B., of N. J.; J. D. S., of N. Y.; G. S., of Mass.; J. M., of N. Y.; J. P. W., of N. Y.; J. D. B., of Ill.; C. F. D., of Maine; H. L., of N. Y.; T. N. D., of Ind.; A. L. G., of Mo.; B. B., of R. I.; B. & H., of N. Y.; Z. P. L., of Conn.; A. B. L., of R. I.; J. E. P., of N. Y.; S. C. T., of Mich.; T. M., of N. Y.; G. W., of Mass.; E. D., of N. Y.; J. M., of N. Y.; A. C., of Cal.; S. E. T., of N. J.; F. H. P., of N. Y.; J. H. G., of Ohio; D. T. C., of Ill.; S. M. S., of Iowa; W. H. M., of Conn.; J. H. C., of Mass.; C. D. R., of N. Y.; T. H. W., of N. H.; A. R. D. of N. H.; F. G. B., of Conn.; B. & P., of Mo.: F. J. E., of Ill.

CHIEF QUARTERMASTER'S OFFICE,
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Samples of such articles as are required to be army standard can be seen at this office.

Each bid must be guaranteed by two responsible persons, whose signatures must be appended to the guarantee, and certified to as being good and sufficient security for the amount involved by some public functionary of the United States.

Bids from defaulting contractors, and those that do not fully comply with the requirements of this advertisement, will not be considered.

Blank forms for proposals, embracing the terms of the guarantee required in each bid, can be had on application at this office, and none others which do not embrace this guarantee will be considered, nor will any proposal be considered which does not strictly conform to the requirements therein stated.

The bids will state the number and quantity of each kind of article proposed to be delivered.

Deliveries must commence within ten days from the date of the award.

Proposals must be endorsed "Proposals for Army Supplies," stating on the envelope the particular article bid for.

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For further particulars address—

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TO ENGINE BUILDERS.—ALL PERSONS WHO may be building or using Steam Slide Valves, having two or more bars across the face, acting in combination with two exhaust ports to each end of the cylinder, are hereby notified that they must obtain a license to use the same under my Patent, dated Jan. 9, 1855, or they will be subject to prosecution for infringement. WILLIAM CLEVELAND HICKS, 480 Broadway, New York. 19 4

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Payment will be made in checks payable in certificates of indebtedness, when seven (7) or more horses are received. Price, one hundred and sixty dollars each.

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THEYSON & OGG, 39 GREENE STREET, NEAR Grand street, Machinists, Brass Finishers, and Model Makers Experimental Machinery, Indicators, Registers, and Steam Gages of any kind accurately and promptly made. 11 11*

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A MESSIEURS LES INVENTEURS.—AVIS IMPORTANT Les inventeurs non familiers avec la langue Anglaise, et qui préféreraient nous communiquer leurs inventions en Français, peuvent nous addresser dans leur langue natale. Envoyez nous un dessin et une description concise pour notre examen. Toutes communications seront reçues en confidence.

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Steel-capped Rail and Improved Spike.

Steel rails are gradually coming into use in this country. The great Pennsylvania Railroad Company have purchased 150 tuns of steel rails to lay down about depots or other points where much wear occurs. Tests made in England show that while iron rails lasted only a few months those made of steel lasted as many years, and are still fit for use. The rail shown herewith is iron, but steel-capped. It is a made-up rail, or composed of sections. These are tongued and grooved together, as shown in Fig. 2, and the several lengths break joint with each other, as in Fig. 1, at A, while the steel cap breaks joint again with them, so that an even and smooth surface is obtained, without ends liable to spring up for the car wheel to strike against. The steel cap, B, is rolled in continuous lengths of convenient dimensions. The rails are also rolled, of course, and the cap is pushed in as each length of the rail is laid. Where injuries occur to the steel it is easily renewed,

Fig. 1

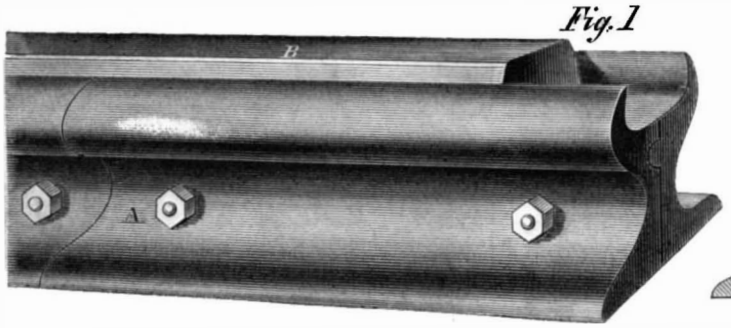
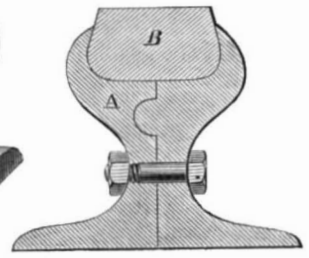


Fig. 2

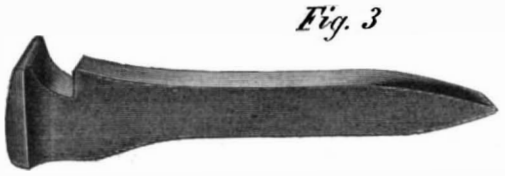


TELLER'S STEEL-CAPPED RAIL AND IMPROVED SPIKE.

without causing delay or detention.

In Fig. 3 a peculiarly-formed spike is shown, which holds the rail firmly. It has a recess under one side of the head, and a swell just opposite the recess; the face of the spike next the rail is also curved. The object of this form is as follows:—When the spike is driven it is placed close to the rail, and as it goes in hugs the iron closely, so that when the lower flange comes to the recess the head springs in, being forced to by the swell behind. This form gives a spike

Fig. 3



which can never get loose by rising from its bed. Spikes so made will hold the rail as in a vise, and we consider it an extremely useful improvement. They are as easily made as common spikes.

A patent is now pending on this spike through the Scientific American Patent Agency. A patent on this rail was ordered to issue quite recently. For further information address the inventor, Mr. Geo. D. Teller, Buffalo, N. Y.

A Watch with One Wheel.

A Sacramento (Cal.,) paper has the following paragraph:—"While in San Francisco the other day we saw in the shop window of Mr. Otto Weiderow, on Montgomery street, some of the most ingenious pieces of mechanism we ever witnessed, and more ingenious than we ever dreamed of. Mr. Weiderow has invented and manufactured a watch that has only one wheel. This wheel, a mainspring, and a very little other machinery, is so arranged that the watch when set going, winds itself up, and it will run two years. It would run forever if the material would hold out, but the ingenious inventor says it is necessary to take it apart once in about two years for the purpose of cleaning and repairing the worn parts. It is certainly a very ingenious, yet a very simple and successful piece of work. Mr. Weiderow is also the inventor of a new sort of clock, with engine movement, the pendulum of which is on top, and works like the walking-beam of a steamboat. One of these ingenious and simple clocks, with silver dial gold plated, and gold hands, has been manufactured for exhibition at the Mechanic's Fair, in that city."

Why Boots Should be Polished.

Brightly-polished boots are cooler in warm weather and warmer in cold weather than dull and dusty boots; for in warm weather they reflect the sun, which dusty and dirty boots absorb; and in cold weather the clean boot does not allow the warmth of your foot to radiate freely, whereas the unclean boot does. Clean, bright boots are consequently more comfortable, as well as respectable, both in warm weather and cold. Not only will different substances, as iron and wood, give out heat or take it in, more or less, but the same substance radiates heat more or less, actively as it is bright or dull, rough or smooth. Now, dirty boots are rough as well as dull. They have a surface of many little hills and valleys, so that in truth, there is more surface for the heat to pass through either way. As a rough surface is a larger surface, more heat from within and without always passes through dull and dirty boots than polished ones.

Rosin Production in Michigan.—J. D. Sturtevant, of Muskegon county, says:—"This season has been so dry that the farmers on our oak openings were obliged to resort to some other business besides farming for a living. Some two or three have experimented in rosin from the common white pine. The white turpentine is saved and simply boiled down, thereby losing all the oil or spirits of turpentine, bnt saving the rosin, a sample of which I send. Our farmers think they can make money at it at one-half present prices ($40 to $50 per barrel). There are several going into the business on a larger scale another spring. The sample is light colored, clear and free from specks, a very nice article."

[If these men would separate the volatile parts of the pitch from the rosin in a still, and condense the oil, they would find that far more valuable than the rosin. Rosin has been regarded as a waste product in procuring spirits of turpentine.—Eds.

Cost of Steam Plowing.

A gentleman of long and careful experience with Fowler's Steam Plow, the cost of which, with its tackle was about £1,000, states that he has it in use for plowing 100 days in the year on an average; that he allows 5 per cent interest and 10 per cent more for wear and tear, or seven-tenths its cost, as the engine is in use for threshing, chaff-cutting, sawing, grinding, etc., three-tenths the time; and that adding to the foregoing allowance, 7s. 4d. per day for repairs of engine and tackle, 15s. 6d. per day for coal, oil and tallow, 11s. per day for wages of attendants, and 7s. per day for water cart, he makes the average cost of plowing in this way a fraction under 8s. (say not quite $2 per acre. As the price for plowing by horses in his neighborhood was more than 50 per cent higher—from 12s. to 14s. per acre—the saving was very great. Eight acres plowing was an average day's work.

Shoddy Leather.—We have seen, within a few days, some specimens of a fabric which we presume is no novelty to our friends in the shoe trade, but which was entirely new to us. This fabric is a manufacture from refuse scraps of leather, which are reduced to a pulp by grinding and maceration, and reconverted into solid "sides" of leather, by pressure. The article thus produced is used mainly, we understand for inner soles, but to an unprofessional eye it seems as suitable for all the purposes of leather as the original article.—*Salem Gazette.*

A New Kind of Flour.—Grain and flour having become scarce, the rebels have devised a new source of supply, which is thus described by the Savannah *Republican*:—"We have a sample of sorghum flour, made of the seed of Chinese cane, which may be seen at our office. The planter who sends it to us had no means of bolting this flour, nor had he taken off the hull of the seed before grinding, the consequence is that the flour has a pinkish color. Those who have made a trial of this excellent flour represent it to be an admirable substitute for buckwheat. Made into hoe cake it is a very savory bread. It is likely to come into very general use, if prepared like wheat flour by bolting."

Profits of Pickle-makers.—Mr. L. H. Butler, of Jefferson, Cook County, Ill., has grown sixty acres of cucumbers this year, which are made into pickles. Mr. Butler estimates that his pickles cost him about 23 cents per bushel delivered in Chicago. He has now 1600 bbls. in the salt, for which he has been offered $16 per bbl. He expects to receive $20 per bbl. Even at the former price it is easy to see that a nice little fortune is in the hands of the enterprising and energetic planter. Let us all go to raising pickles.

THE

Scientific American,

FOR 1864!

VOLUME ELEVEN

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of all the latest and best inventions of the day. This feature of the journal is worthy of special note. Every number contains from five to ten original engravings of mechanical inventions relating to every department of the arts. These engravings are executed by artists specially employed on the paper, and are universally acknowledged to be superior to anything of the kind produced in this country.

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